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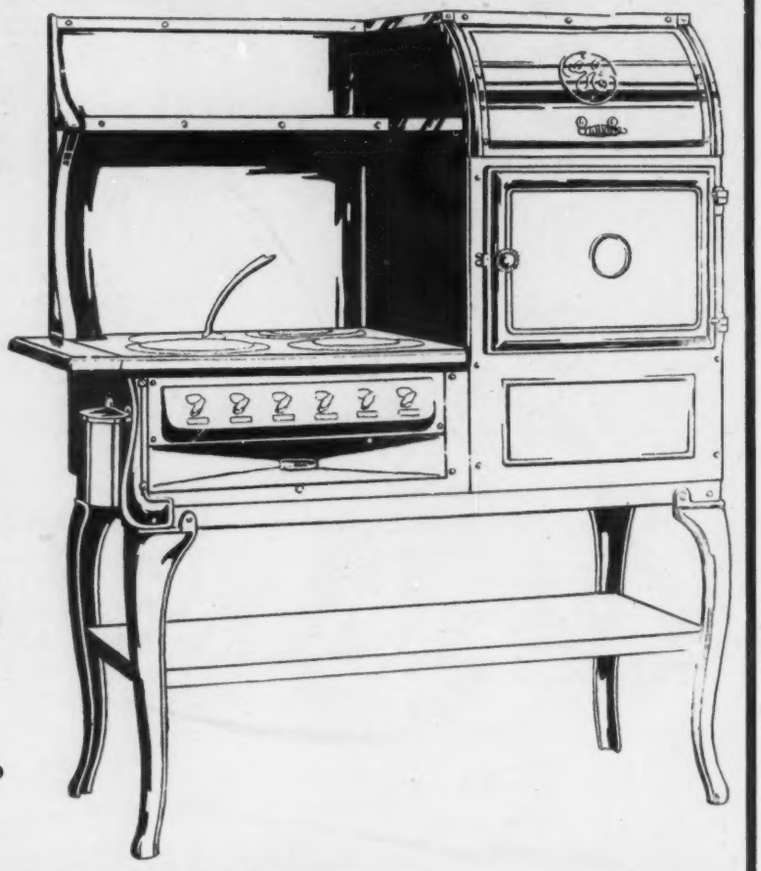

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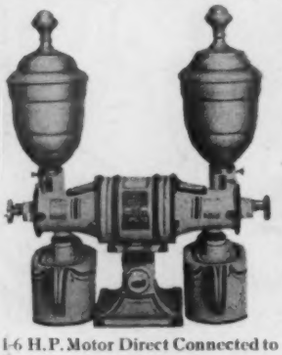

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ILLUMINATION AT SALT LAKE CITY

BY BAYARD W MENDENHALL

The Beautiful Lighting Effects at Salt Lake City.

Salt Lake City celebrated the inauguration of its new "White Way" lighting district on the evening of September 29th with impressive ceremonies.

This new lighting system, which is generally referred to as the Salt Lake System, extends from South Temple street to Fifth South street on Main street, a distance of five blocks or approximately three-quarters of a mile. It covers the entire retail business district on this main street. There has previously been more or less rivalry between the upper and lower main street merchants and property owners, and since this system has been inaugurated it is believed sectionalism will vanish on the street.

President F. C. Richmond of the Salt Lake City Commercial Club, which has co-operated with the various interests in making this splendid system possible, acted as master of ceremonies and introduced the speakers.

In order to make the system permanently successful it was decided to appoint a committee to take up with the legislature, then in session, the proposition of amending the law already on the statute books creating special lighting improvement districts, this law having been found not to be in conformity with other laws pertaining to special assessments. The Commercial Club and others interested in the proposition co-operated with the committee and succeeded in having the law properly amended and signed by the governor. Petitions were then circulated among property owners. As originally contemplated, only one block on upper Main street would be installed, but as the movement progressed, first one block and then another was added until finally petitions were presented to the city council asking them to create a lighting improvement district covering five blocks on Main street. On March 20, 1916, the city commission passed a resolution declaring their intention to make this improvement in accordance with the provisions

Typical Ornamental Lamp Design at Salt Lake City.

of the law. Subsequently bids were had, the contract was awarded to the Utah Power & Light Company and the work started. It was originally intended to have the system in operation by midsummer but this was found impossible owing to the delay in securing the material from the manufacturers.

Mr. Ryan, the designer of the system, whose zeal and enthusiasm had been so potent in securing the confidence of the property owners and in convincing them that the system would be all that he promised for it, had made a special trip from San Francisco to attend the ceremonies and was greeted by rounds of applause when President Richmond introduced him as the man who had made the Panama-Pacific International Exposition famous by the lighting system he had designed for it. Mr. Ryan stated that on account of its broad streets, Salt Lake presented an unusually interesting problem in special street lighting design. He called attention to the fact that he had promised the property owners that they should have a substantial, dignified, standard with an evenly distributed illumination well out of the eyes of the pedestrians, which would give a practically uniform distribution of light on the street, sidewalk and facade of the buildings. He called upon the throng present when the system was turned on, to witness how nearly his promise had been fulfilled. He closed by declaring "The West has always done the pioneering. Tonight we are making history. I am proud to have been associated with this magnificent piece of Western enterprise."

The Hon. W. Montgomery Ferry, mayor of the city, was the last speaker. He praised the progressive citizens of Salt Lake City which made this enterprise possible, thanked those responsible for its being, and declared that this type of lighting hereafter would be known as the Salt Lake system and that Salt Lake City would derive much desirable publicity therefrom.

The old street lighting system was then extinguished and the new one turned on. The band played, the crowds cheered and gazed about them in wonder.

There are seven standards to the block on each side of the street approximately one hundred feet apart. Each standard carries three six and six-tenths ampere inverted type G. E. luminous arc lamps. The standard fits over the regular trolley pole and completely conceals it. It has an ornamental cast iron base and a pressed steel column in two sections with the three armed cast iron fixture carrying the lamp mounted on top. The lamps are equipped with diffusing glass ware. Each lamp is rated at 1500 candle power and the absorption is approximately 30 per cent. They are connected on two circuits, one circuit supplying 190 lamps, which operates until midnight, the remaining twenty lamps burn all night.

The total cost of installation of the system was $28,220. The cost to the property owners was $25,535, and the city bore the balance of the expense. The installation charges against the property owners amount to $4.12 per front foot. The total cost of operation for the three-year period of the contract is $28,138, of which amount the city pays approximately $4000. The cost of operation to the property owners is approximately $1.30 per front foot per year. The Utah Power & Light Company spent approximately $12,000 for rectifiers and other station equipment necessary to supply the installation.

The city issued to the Utah Power & Light Company in payment for the cost of installation and for the cost of operation for the period of three years, over which the contract runs, lighting improvement disrict bonds, which bonds are secured by a mortgage which is a first lien on the property included within the lighting improvement district. The company had no difficulty in disposing of these bonds at par. The property owners have the option to pay the cost of installation and operation in full or to pay it in three annual installments.

TRADE ACCEPTANCES FOR THE ELECTRICAL CONTRACTOR.

BY P. J. AARON.

(Here are some practical ideas on how to improve credit conditions in the electrical contracting business. An account is also given of the use of trade acceptances at Portland. The suggestions formed the concluding portion of a paper presented at the Seattle convention of the Washington Association of Electrical Contractors and Dealers. The author is with the Fobes Supply Co. at Seattle.—The Editor.)

If the jobbers will put trade acceptances into use, it will eventually come about that the contractors will use them with their customers. The fact that contractors have to settle their accounts with trade acceptances will be an argument which they can use to their customers. I do not pretend to say that the contractors can use them in all cases, to start with at least, but today there are a great many cases to which these trade acceptances would be applicable.

You have all had the experience of finishing up a job which was to be paid for possibly on the tenth of the month following, and when you went around to collect, your customer informed you that he was sorry but he would be unable to settle the account today, owing to the fact that he expected to get a loan, or so and so was not there, or this excuse and that. But at the time he made no criticism of the job. You felt that the customer was perfectly responsible and solvent. You did not want to use your lien rights. Therefore, the only thing to do was to wait, especially as you expected him to have additional business for you some time in the future. This account finally dragged out, perhaps a month, perhaps sixty days, and when they finally got around to pay you they began to take up counter-claims; your wireman damaged the tinting in some room, or there was to have been a switch at the head of the stairs which was not put in, or the foreman on the job had promised them a set of three-way switches and they are not there, or there was to have been a light in the attic,—which claims are set up with the idea of getting a discount or for the purpose of obtaining more time to settle the account. The job having been completed for some time makes it hard to run down these claims, and perhaps the man that did the work has left your employ.

If at the time payment was due on the job you had gone to this party and said, "I am willing to give you additional time, but I want a trade acceptance, the job is completed and payment is due"—the customer could offer no argument against giving you this trade acceptance for thirty days, or sixty days if you saw fit to grant it to him; and if he does refuse under these conditions to give you an acceptance, my advice is that it is time that you protected your interest against the property. If he has any complaints, the time to make them is at the finish of the job. If he signs your acceptance he is barred against complaints when the time for payment comes.

If you do get acceptances and do not have arrangements whereby you can bank them yourselves, the jobbers will undoubtedly take them from you and give you credit. You will thus have a much larger share of your assets working for you all the time than you do under the present methods of doing business.

The jobber's adoption of the trade acceptances in doing business with you would stop your over-buying, it would help to prevent your contracting in a class where you do not belong, as it would put squarely up to you the matter of financing your own business to a greater extent than you are required to do now, and it would tend to make you better business men.

In operation, some customers will fail to pay when the acceptances come due, and in such cases, of course, the endorser has to make good. Some of you may offer this as an objection to taking trade acceptances from your customers, but this is not a criticism of the system but a criticism of the individual. Is it any worse for you than if you had that man's account on your books? In other words, if you had a trade acceptance for $100 due on the tenth of the month and the customer failed to pay, you would have to take it up from whomever you had discounted it to, and then charge it back on your books to your customer. You are in the same position then as though his account was an open account on your books during all that time, the only thing you lose being the interest rate at which the acceptance was discounted, and as an offset to this you have had the use of the money during that period.

If all the accounts owing you in dollars and cents were owed you by one customer, and you took a trade acceptance from him, I grant you there would be some danger in the transaction. But of every $1,000 owing you the chances are the acceptances would run from $25 up to $400 or $500, and the general experience has been that only about ten per cent of trade acceptances are dishonored. Therefore, out of this $1,000, you might possibly have $100 to take back. But $900 of the $1,000 is yours to use at the time the acceptances are taken, and how much better that is than to have this $1,000 on your books dragging along through the same period and perhaps only realizing $400 or $500 out of it.

In case a jobber takes acceptances from you and you fail to meet an acceptance when it comes due, you are not going to be put out of business at once. It simply means that the jobber has to dig up the money for this acceptance and he then must decide what he is going to do to you to cause you to pay. He may see fit, if conditions are right and proper, to take a note from you; or he may see fit to carry the acceptance for a week or ten days or he may sue you. But any way it is finally settled this dishonored acceptance is going to be a red flag in the collecting department of that jobber, and unless the contractor makes good in a reasonable time on this dishonored acceptance that jobber will be a fool if he extends any more credit to that account. To me this feature of the trade acceptance is the biggest asset of all to the jobber.

In Portland we have worked out a plan for the use of these acceptances. This plan applies to September business and will be used in the settlement of our October first statements. It does not apply to old balances which we may have against contractors and dealers, but it takes a fresh start with purchases made after September 1, 1916. The old balances will have to be worked out from time to time and cleared up as

conditions will allow. So far as I know no other jobbing house has at yet put in any plan using trade acceptances, but I have hoped that a number of them will follow our lead. Of course, if our plan is wrong and does not work out successfully, we will have to go back to the old system, but I sincerely trust that we will not find this necessary. Our plan has the approval of the majority of the Oregon contractors and is worthy of consideration by you.

Briefly the plan is as follows: By paying our invoices ten days from date we will allow all cash discounts shown on the invoices. This means that the five per cent invoices can be picked out and paid and the balance of the invoices allowed to go through to statement if desired.

By paying our total invoices twice a month, those from the 1st to the 15th by the 25th, and those from the 15th to the 31st by the 10th of the following, we will allow all the cash discounts shown on the invoices.

By paying our monthly statement on the tenth of the month following we will allow a flat two per cent discount on the entire statement, with the exception of rubber covered wire, weatherproof wire, lamp cord, bare wire, annunciator wire, and such items as carry no discount.

If the customer, instead of paying the statement on the tenth of the month following, wishes an additional thirty days, and will give us a trade acceptance covering the statement in full, we will credit him not only with the acceptance but with a flat one per cent discount, with the exception of the items last enumerated.

In case a customer needs sixty days beyond the tenth of the month following his purchases, and he will make special arrangements with us for this time (which special arrangements of course consist in convincing us that his affairs are in such condition that we are willing to grant this time), we will take a sixty day trade acceptance from him, not allowing any discount.

These acceptances do not carry interest and the sixty day acceptances means that the contractor will be paying for September purchases on December tenth following.

In case our statements are not settled either by cash or by trade acceptances we will charge 8 per cent interest, such interest dating from the date of the statement. You will realize that this interest charge is not made with the desire to collect interest, but is made for the purpose of getting all of our customers to settle our statements either by payment or by the acceptances. You will also realize that the matter of credit still enters into the transaction, and the fact that we are now about to take trade acceptances does not mean that we will extend credit to those who are not entitled to credit under the old terms.

The average discount rate at which the banks will handle an acceptance is six per cent, and I want to give you an example of how our plan operated from the standpoint of net results.

We will suppose a customer during the month of September buys $100 worth of pipe on four or five invoices. If he paid these invoices ten days from date, or paid twice a month, he would be entitled to a five per cent discount and we, therefore, would realize, $95 net on the account. If he paid his statement on the tenth of the month following he would be entitled to two per cent and we would, therefore, realize $98 out of the account. If he settled his account by a thirty day acceptance he would be entitled to one per cent and we would therefore receive $99 from him, but it would cost us 50c to discount this thirty day acceptance so we would really realize $98.50 on this $100 account. If he settled with us by a sixty day acceptance he would get no discount and we would receive from him the $100, but it would cost us $1 to discount the acceptance and we would realize but $99 out of the transaction.

You will note that in the three last instances, namely, payment by customer of statement, settlement by thirty day acceptance, and settlement by sixty day acceptance, that we realize in cash on the tenth of the month following the sale $98 in the first instance, $98.50 in the second instance, and $99 in the third instance. The $98 settlement is complete, in that he paid cash on his statement; the $98.50 instance is not as yet absolutely complete as we are an endorser on his acceptance and for this endorsement we are realizing fifty cents. In the $99 case the transaction is not entirely completed as we are endorser on his sixty day acceptance and we are realizing $1 for such endorsement.

This plan which we are putting in is not just what I would wish it to be, but is as far as we can go without materially changing the present methods of doing business, and this we cannot do without the co-operation and approval of the contractor and dealer, and the co-operation and approval of competitive jobbers. I believe the time will come, however, when all will realize that the present methods of doing business must change, and that eventually a firmer plan than the one we are about to use can be worked out that will put the jobber-contractor-dealer business on a higher plane. I firmly believe that this plan if carried out to the proper co-operative extent would cure seventy-five per cent of the troubles that exist in our business today.

WATER SUPPLY FOR THE CITY OF SACRAMENTO.

A report upon "Possible Sources of Water Supply for the City of Sacramento, California," by Messrs. Hyde, Wilhelm & Miller, has just been printed. Various sources were considered, including the pumping of ground waters from an area east and southeast of Sacramento. Investigations of well records, present development and sources of replenishment were made. It was concluded that the main source of the deeper ground waters in the vicinity of Sacramento are derived largely from the direct percolation of rain rather than from seepage from stream channels. The ground waters have a slope south of westerly of about 4 ft. per mile and are estimated to have a velocity of only 540 ft. per year. It was concluded that the supply was insufficient for the future supply of Sacramento and also that the legal complications which might later arise with overlying land owners who might pump for the irrigation of their lands might add undesirable complications. A filtered supply from the Sacramento River was recommended.

ELECTRIC POWER FOR IRRIGATION PUMPING

DEPARTMENT CONDUCTED BY S. T. HARDING

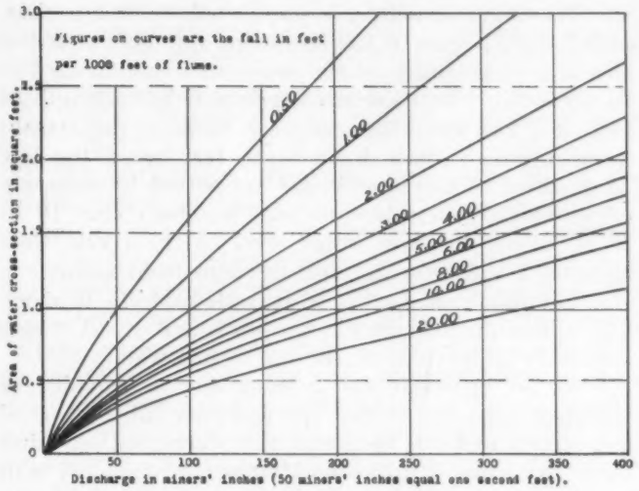

Fig 4. Carrying Capacity of Small Wooden Flumes in cu. ft. per sec.

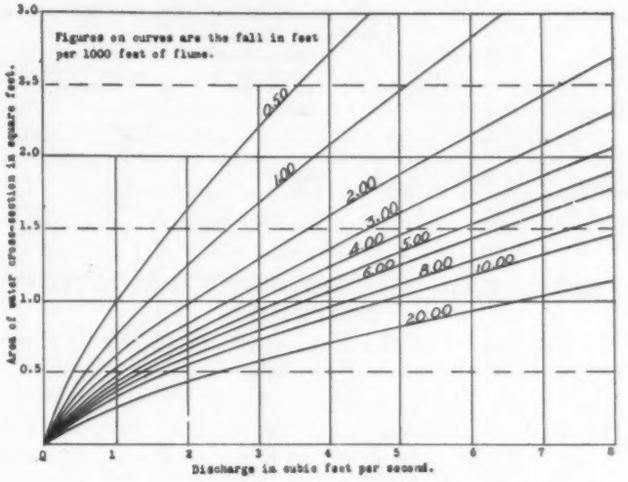

Fig. 5. Carrying Capacity of Small Flumes in Miner's Inches.

DESIGN OF SMALL LINED CANALS.

Lined channels.—Curves for the capacity of wooden flumes are given in Figs. 4, 5 and 6. These are similar to those given for earth ditches. The depth of flow is usually about one-half the bottom width. These curves are based on a value of "n" in Kutter's formula of 0.015. Well built large flumes may have a lower value of n, for farm flumes better capacities are not usual. The carrying capacity of small concrete flumes or lined ditches can also be obtained from these curves as there is usually little difference in the friction factor.

Vertical sided concrete flumes such as are used to distribute water to furrows cost from 20 to 30c per lineal foot. A concrete lining on the bottom and sloping sides of a small earth ditch will cost from 4 to 8 cents per square foot, depending on the thickness and accessibility of materials. Thickness of 1 to 2½ inches would be used in farm practice. These costs are equivalent to 15 to 25 cents per lineal foot for the smallest sizes to 30 to 50 cents for ditches 2 ft. wide on the bottom. Such lined ditches are not used on farms to any extent due to the high first cost and the liability to change in location of field ditches with changes in crops.

Wooden flumes set on the ground are also not usual, although such flumes are frequently used to cross depressions. Where no trestle is required the cost of wooden flumes will be the local price of lumber plus from $6 to $8 per M. BM. for labor. This will give usual costs of 10 to 20 cents per lineal foot, depending upon the size. Triangular or V shaped flumes of small capacity may be built for somewhat less.

Crossing depressions.—The previous discussion has been based on channels in evenly sloping land. Where the channel must be supported above the surface as in crossing depressions a wider choice of method is available.

Water can be carried in earth ditches built in fill. Where the bottom of the ditch is more than 2 ft. above the surface of the ground for any distance other forms of channel for farm ditches are preferable. In many cases flumes would be used for heights of one foot or more. The material required for an earth fill increases nearly as the square of the height. The width of land covered also increases as well as the liability to breaks in the fill.

Wooden or steel flumes or pipe siphons can be used. Flumes are more usual..

The length of ditch required per acre irrigated depends on the method of irrigation used. The controlling factor is the length of run of the water over the land or the distance between ditches. If furrows or checks 660 ft. long are used less than one-half as much field ditch will be required as for runs of 330 ft. Long narrow checks will require less ditch per acre than square checks of equal area. The lengths of ditches required for different sized fields and lengths of run is shown in Table 1. Dividing the length of run by two more than doubles the length of field ditch used due to the supply ditch required along the side of the field. If the topography is such that the ditch can

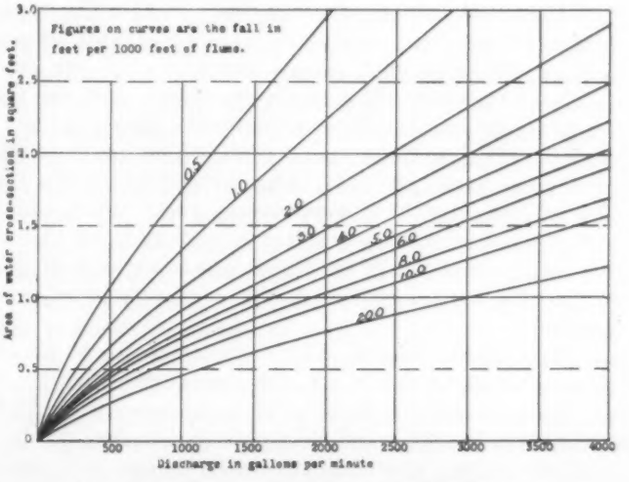

Fig. 6. Carrying Capacity of Small Flumes in Gallons per Minute.

serve checks on both sides the amount of ditch will be reduced by nearly one-half. This usually occurs with rectangular level checks and sometimes with strip checks where there is a ridge in the field.

Table. 1. Length of Ditch Required for Different Length of Checks or Runs.

	40 Acre Field.		20 Acre Field. Length down the slope.		20 Acre Field. Length across the slope.	
Length of check in feet.	Total length of ditch in feet.	Feet per acre.	Total length of ditch in feet.	Feet per acre.	Total length of ditch in feet.	Feet per acre.
1320	1320	33	660	33	....	...
660	3300	82	1980	99	1320	66
330	6270	157	3620	182	2970	148
220	9020	223	5060	253	4400	220

REPORT ON THE MODESTO IRRIGATION DISTRICT.

The report of the chief engineer of the Modesto Irrigation District covering the recent period of betterment work has just been printed. This report by Mr. F. C. Herrmann gives descriptions and costs of about $500,000 worth of improvement work carried out from March, 1915, to June, 1916.

At the beginning of the irrigation season of 1915 a comprehensive reconstruction program was undertaken, the actual construction work to be done mainly between the irrigation seasons. A bond issue of $610,000 was voted. Par value was obtained for $25,000 of bonds sold to the State Board of Control and the remainder sold at 90.6 per cent of par value.

The new work has been designed for a capacity of 2000 second feet above the Dallas-Warner reservoir and 1200 second feet from the reservoir to the district line.

The time for doing the work was very favorable as material and labor markets were depressed. The district was in a position to make monthly payments in cash. The work was let in contracts of from $25,000 to $75,000 with active bidding, good prices being secured by the district.

The distribution of the expenditures was as follows:

Payments to contractors	$382,230
Direct expenditures for construction by district forces	70,810
Expenditures for rights of way and damages	7,110
Total expended for direct construction and rights of way	460,150
Overhead expended for borings, test pits, advertising, engineering and inspection = 7 per cent of total	32,510
Total expenditures	$492,660

The overhead expense was 6 per cent on the upper works, 10 per cent on lateral structures and 14 per cent on drainage ditches, an average of 7 per cent on the total cost. The lower overhead cost on the upper works was made possible by the larger units of work handled and the speed with which most of the work was accomplished. The structures within the district consisted of comparatively small units which under a contract basis required relatively high cost of inspection. Overhead on drains has been highest due to the slowness with which the contracts have been handled.

Dry Creek Flume.—The most striking single structure built is the Dry Creek aqueduct or flume. A reinforced concrete flume having a capacity of 1200 second feet is supported on arches in crossing the bed of Dry Creek. The original structure was a wooden flume partly supported by a steel truss. Dry Creek carries large volumes of water at certain times of the year so that the type of earth fill used on the upper main canal could not be used. The arch type of concrete flume was adopted in order to secure ample waterway.

The main structure is supported by five arches, each having a span of 100 ft. and an approach at either end, the total length of the main structure being 730 ft., including transition and sandbox it has a length of 1100 ft. The abutments on each bank of the stream channel were carried down seven feet below the low water level of Dry Creek and supported by concrete piles, which penetrate into hard compact clay 18 to 27 ft. below the low water level of the creek, thus insuring a safe bearing with freedom from scour.

The flume channel is 18 ft. wide and 9½ ft. deep. The minimum thickness of the walls is 8 in. A three-foot walk is provided at the top of one wall.

At the upstream end a wasteway is provided of sufficient capacity so that the full flow can be turned into Dry Creek. The gates are depressed so that three 5x5 gates can handle 1200 second feet. A wall 3 ft. high extends diagonally upstream across the entrance of the flume, the purpose being to intercept sand deposits which can be sluiced out through the wasteway.

The contract prices were $14.55 per cubic yard for concrete above the spring line of the arches and $13.80 per cubic yard below. The price for concrete piles was 75 cents per lineal foot. There were 3361 cubic yards of concrete and 3760 feet of concrete piles. The total contract price was $62,770. The district expended $2125 for the gates and miscellaneous work and $3430 or 5 per cent for borings, advertising, engineering and inspection.

Hydraulic Fills.—The policy of replacing timber flumes by hydraulic fills in creek crossings was continued. About 350,000 cubic yards of material was placed at contract prices varying from 22.8 to 25.5 cents per cubic yard. The total length of flume replaced was about ¾ of a mile. The heights of fill varied from 50 to 100 ft. On the crest of the fills reinforced concrete lined canals designed to support the earth thrust when empty and the water thrust without backfill are built. The channels have a depth of 11 ft., a bottom width of 22 ft. and a top width of 28 ft.

Concrete Lining.—Over 7000 ft. of canal varying from 24 to 40 ft. in bottom width, and from 8 to 11 ft. in depth, with side slopes of 2 to 1 were lined with concrete 2½ in. thick. About 600,000 square feet were placed at a contract price of 6¼ cents per square foot. The contract price on earth excavation was 47 cents and on hardpan 73 cents per cubic yard.

A number of concrete checks, drops and lateral headgates were built on the distribution system. The contract prices on the reinforced concrete varied from $11.25 to $14.75 per cubic yard. On the main canal the prices ranged from $14 to $16.50 per cubic yard. A total of about 16,000 cubic yards were placed.

It is expected that the recently organized Waterford Irrigation District will complete arrangements for securing 250 second feet through the Modesto canal. The payment of $254,000 for this service is expected to complete the capacity to the Dallas-Warner reservoir to 1700 second feet with a capacity of 2000 second feet on all new work.

THE COST OF PROGRESS.

BY LESLIE CRAVEN.

(In this article the author concludes his excellent discussion begun in last week's issue on this important subject relating to the penalties of progress. The author concludes that if a proper development of utility usefulness is to be attained, a realization of a careful and adequate consideration of the risk so peculiarly serious in the electrical industry is absolutely necessary, not only on the part of the utilities, but by the public and its regulatory authorities.—The Editor.)

All authorities, therefore, agree, that the problem of what provision should be made to care for functional depreciation or obsolescence is a problem peculiar to each particular plant. Conditions in each case are so variable that generalities are useless. By a consideration of tens of thousands of individual cases, it may be possible to obtain statistics upon which to calculate the risks of fire and accident insurance, and then by insuring tens of thousands of houses or persons, to collect a fund sufficient to pay the losses. The reliability of such data arises only because of the multitude of instances which are considered in obtaining it. The experience of no such multitude of individual units is available in any study of obsolescence. The experience of other companies in other fields is of little value, excepting in so far as it points to general principles. Deficiencies in the character and size of plants, in the size and nature of loads, in the trend and rapidity of community growth, in the temperament of the people served and of their regulatory agencies, impair the value of any definite statistical information when used in a particular case in another field. The problem is for every company a peculiar problem. Past experience is a guide only in showing that these are risks against which protection should be made, that such rates should be charged that the public will pay the full cost of the service rendered by recompensing the utility for the property thus sacrificed, an dthat business should be done upon such a margin of profit as to allow the accumulation of a surplus for this protection.

In the past, protection against this risk has received scant consideration among the public utility companies of this part of the country. Business practice has condemned a failure to insure against the danger of loss by fire but there has not been a similar condemnation of the failure to protect investments against the very similar loss arising by virtue of municipal regulation or by virtue of improvement in construction or design. This failure among manufacturing enterprises has occasioned numerous financial disasters where by reason of a false sense of security due to inadequate cost accounting, financial distress has resulted from a failure to maintain the integrity of the investment. Among a large majority of the public utilities there has been a similar failure, though not such financial distress.

The regime has been one laissez faire. There has not been the necessity, therefore, which is now created by regulation, of closely accommodating rates to a fair return upon the present value of the property devoted to public use, nor has there been the necessity of maintaining the close relation between the value of the property and the capital account. The careful regulation of public utility earnings upon the basis of the value of property devoted to public use has made the present issue an important one. Business was formerly done upon a wider margin and the greater latitude allowed greater opportunity to regain losses from such risks. Adequate systems of cost accounting were not in general use and rate structures bore no close relation to costs of service. No charge was made in operating expenses to cover either physical or functional depreciation. In many companies no particular consideration has been given to the effect of depreciation or obsolescence upon the cost of service because of the general inadequacy or lack of system of cost accounting. Regulation has brought about the necessity for such systems. It has not been the general practice among these companies to write out of the plant accounts the losses of property due to either physical or functional depreciation, nor to accumulate reserves to care for these losses. Often they have been in the developmental period when earnings did not suffice to provide for the accumulation of such funds, and frequently the funds were paid out in the form of dividends, thereby amortizing the capital account. Among some companies it has been thought necessary to show low operating costs and to maintain the book value of the property, in order to facilitate the necessary financing of the enterprises at times when in growing western communities financing has been difficult and frequently necessary.

The dangers of these loose methods of treatment of depreciation have been mitigated, and the financial disaster which might be expected to attend, has been averted, by virtue of the phenomenal increase in the value of the real estate and water rights of the companies operating in this section of the country, the increments in value of those portions of the plant being more than ample to absorb the losses of value arising by virtue of obsolescence and depreciation. In this manner these losses have been regained. The correctness of this conclusion has been frequently demonstrated in recent valuation cases where the relation of the present value of the property to the original investment in the property or to the capitalization or plant account of the utility, has been under investigation.

An examination of the trend of public utility law and of current commission decisions seems to justify the conclusion, that under the system of regulation now prevalent, there should be greater recognition of this risk and its effect upon value, earnings, and cost of service. The public utility acts of many states require that funds shall be accumulated to protect the property against both sorts of depreciation. The Oregon act, for example, requires that: "Rates shall be such as will provide the amounts required above the expense of maitenance to keep such property in a state of efficiency corresponding to the progress of the industry." (Laws of Oregon, 1911, Ch. 279, page 487.) These acts, and the doctrine announced by the Supreme Court in the Knoxville Water Company case require that adequate provision be made. There are equally cogent reasons in the principles of physical valuation. Although these doctrines are yet in a state of flux, the modern tendency of commissions is to

follow the much quoted dicta of Mr. Justice Hughes in the Minnesota Rate Case, (230 U. S. 352), where the court said:

"The basis of calculation is the fair value of the property used for the convenience of the public. What the company is entitled to demand in order that it may have this compensation is a fair return upon the reasonable value of the property at the time of its being used for the public."

Under the doctrine here announced, commissions almost uniformly exclude all property which has been discarded because of obsolescence or inadequacy, or retired because of ordinances or statutes requiring removal, since such property is no longer devoted to the public use.

Thus if a utility has an investment in a unit which, because of functional depreciation, has been retired when only one-half of its natural life has expired, and if depreciation allowances have been accrued on the basis of its natural life rather than the shorter period, and the depreciation allowances are, therefore, sufficient only to amortize one-half of its value, the trend of authority among the commission decisions is not to allow further return upon that property nor to allow the amortization of its value. This means the loss of that part of the investment. This is the result of a logical application of the generally adopted reproduction method in the determination of value for rate making purposes. On the other hand if the utility has properly considered this element of cost and has accumulated replacement annuities which are in a sinking fund, the utility is entitled to a return upon that fund as a part of its property (Bonbright vs. Geary, 210 Fed. 44, 52), or if the more probable course is pursued and the funds are invested in additions and enlargements to the plant, these additions will balance retirements and the integrity of the investment will have been maintained. The importance, therefore, in any adjustment of rates, before a commission or on the initiative of the utility itself, of adequate consideration of this element of cost is obvious.

It should be remembered, however, that in any application of the reproduction method, there is considered any appreciation of value. It is sometimes urged that the possibility of such increments is in itself sufficient protection against the risk. There may occur a sufficient advance in the values of the real estate or water rights of the utility to absorb the loss caused by supercession. This has frequently happened among those utilities operating in regions where there has been a sharp advance in commodity or real estate prices. The possibility of these future increments, however, is a speculative contingency upon which conservative management cannot rely as a substitute for replacement funds to maintain the integrity of the investment.

The determination of what is an adequate provision against obsolescence and inadequacy requires study of the individual conditions of the particular plant and its load or traffic as at present and as probable in the future. For the purpose of the calculation of the amount of these annuities such studies are practicable and although productive of data and information which necessarily, because of the nature of these risks, is neither complete nor adequate, at least may be made the basis of an approximation of what provision should prudently be made in the light of the trend of development of the industry and of the plant, and in light of the probabilities of the losses of the particular plant by reason of that development.

An adequate study of this sort was recently made by Mr. W. G. Vincent, Jr., the valuation engineer of the Pacific Gas & Electric Company, with relation to the San Francisco gas properties of that company in the rate case in the United States District Court in 1914 in which the rates and earnings of the property were in question. In this study he concluded that the physical depreciation of that plant amounted to 2.66 per cent of the depreciable property, and that the functional depreciation in addition amounted to 1.5 per cent. This was based upon a study of the rate of loss during the history of the property and the probable rate of loss of the future.

In any rate case in the determination of what annuities shall be allowed to cover this sort of depreciation, the nature of the risks of the particular plant should be directed to the commission's attention, in order that the amount of revenue allowed to the company shall be adequate to cover the particular risk. This risk of the business is ordinarily covered by the allowance of these annuities. With money at its present cost, in the face of the difficult competition which public utilities must meet in the securing of capital, this risk is not one which is compensated for by the rate of return of from six to eight per cent allowed in current decisions as a fair rate of return upon such investments, particularly, if this rate of return is applied, as frequently it is, to a rate base, which is slightly above the depreciated value of the property.

In this relation attention is called to the fact that the only functional depreciation which is of concern to the utility is that which is greater than the physical depreciation, for it is only when functional depreciation retires the property at an earlier time than physical depreciation demands its retirement, that obsolescence becomes an effective factor and a matter of concern. Otherwise the replacement fund allowed for the retirements due to physical depreciation will suffice. Obviously no provision need be made to cover the risk of obsolescence excepting where it is likely to shorten the life of the units of equipment below the natural life of that equipment as measured by the physical deterioration.

As heretofore suggested, it is a fair deduction from the current authorities that a utility which is able to accrue the funds necessary to make replacements of property and does not do so, in the face of the duty imposed by law, will be deprived in any valuation investigation of that part of the investment, which is lost through functional depreciation and which it fails to so protect. There is no injustice in this rule of law if it is confined to those losses which are due to changes which prudent forethought and careful investigation might anticipate. This generation of the patrons of the utility should not be called

upon to pay, as a part of the costs of the service furnished them, the charge for the use of equipment now obsolete, which was consumed in the service furnished to a previous generation of consumers, and the cost of which was properly chargeable and might have been charged to that generation. But as to losses due to replacements which cannot by any process of study be foreseen, a distinction may be urged. Business conditions, particularly when a utility is in a developmental stage, are frequently such that the revenues of the utility are not sufficient to provide protection. Regulatory practice cannot require the impossible. If losses occur which are not within the range of reasonable anticipation, or occur during times when the business of the utility is in a stage of development in which the market does not justify rates sufficient to allow the setting aside of proper annuities, fair treatment requires that the utility be allowed to earn a return upon the value of the property retired for a sufficient time after its retirement to amortize its value. If such a doctrine is not adopted the hazard of these investments will be very greatly increased, in many cases there will be a practical confiscation of property, and the progress and initiative of the public utility company will be retarded to the detriment of the utility and to the greater detriment of the public.

Retirements due to functional depreciation ordinarily involve improvement of the plant and service. Improvements and obsolescence go hand in hand. Among no business men is there more of a progressive spirit than among the managers of these utilities. In the adoption of regulatory theories in the treatment of the problem, the interests of the public, therefore, necessitate that liberality of treatment which will permit enlightened management in the furnishing of that service, to avail itself of any improvements which the science of the industry affords. Any other course means a penalization of progress. That the utility, where prudent management has been unable to provide from current earnings for the replacement of property retired because of obsolescence, should be allowed to amortize the value of the property after retirement is recognized by the Massachusetts Commission in a recent decision in the rate case of the Marlborough Electric Company, where the court in recognition of the question of public policy which is involved, said:

"It is also of the opinion that one of the important functions of depreciation, beside taking care of the daily wear and tear, is the anticipation of changes in the art and in the possible intervening conditions which, although they may have little or no relation to the useful life of the physical property, yet cannot ordinarily be foreseen. It realizes, however, that a prudent management cannot always have provided fully for changes of this character, and especially in the first stages of the industry, or in a case like this where the business of the earlier years was not profitable. It believes that a proposition to allow the right of the investment to a return, but to disallow in any substantial measure the obligation to keep it good, is not consistent or sound."

The necessity of such treatment of the matter has been recognized to a limited extent by the state commissions in their promulgation of classifications of accounts. The Oregon classification provides for the amortization of the losses incurred through unanticipated reconstruction which could not be foreseen by the exercise of reasonable prudence. This relief is restricted, however, to improvements required by lawful authority, and does not cover retirements due to ordinary inadequacy or improvements of the art, although these naturally should receive the same consideration.

The treatment of this problem of functional depreciation is one regarding which regulatory theory is not yet crystalized. The theory underlying its determination, like the entire theory of which it is a part, is in the process of growth and evolution. If a proper development is to be attained, a realization of the necessity of a careful and adequate consideration of the risk, so peculiarly serious in the electrical industry, is therefore necessary, not only on the part of the utilities, but by the public and its regulatory authorities.

A REMARKABLE NEW OFFICE BUILDING.

What will be the largest office building in the world built for (and used exclusively by) a single railway company is to be, also, the largest office building in the United States west of Chicago. But perhaps the most unique feature of the monster structure is that it is to be the greatest of all buildings ever erected on the avowedly "home-made" plan. In other words every piece of material going into the building will be a product of California, if possible.

This remarkable structure will be the new building now being erected for the Southern Pacific Company, in San Francisco, to occupy an entire city block on Market street, from Steuart street to Spear street, a distance of 215 feet on Market street, with a depth of 209 ft. to the private street running parallel to Market between it and Mission street.

An idea of the immensity of the new building can be gleaned from the fact that it will have a floor space of half a million square feet, or "standing-room space" for nearly four million human beings, making the new Southern Pacific building so large in floor area that the entire population of the State of California could stand up simultaneously in that one building, should ever the occasion demand. The largest number of piles ever used in any one building in the world will go into the foundation of this building—the exact number being 2285 piles, each 115 ft. high, the tops of which will be fastened together by concrete caps. It will take 20,000 cubic yards of concrete and 500 tons of steel, with bricks to the exact number of 2,500,000. The cost of the building will be $2,000,000 without fixings. The contract stipulates that the building will be turned over to the Southern Pacific Company on September 15, 1917, the contractors to forfeit $500 per day for each day of delay, with the company ready to pay the contractors $500 bonus for every day remaining between date of completion and agreed date of turning over to the railway.

PURCHASING.

BY N. L. MORSE.

(These tips from a purchasing agent should be valuable to all public utility buyers. The paper was presented at the 24th annual convention of the Pacific Coast Gas Association, Santa Barbara, Cal., Sept. 20, 1916. The author is purchasing agent for the Southern California Gas Company of Los Angeles. The Editor.)

A purchasing department is an insurance against excess buying, inferior quality, high prices and poor deliveries.

Modern buying is an actual knowledge of existing methods coupled with a persistent effort to evolve better ones.

Modern buying also means standardizing everything possible, with the result that a large number of purchases are made on standard uniform specifications.

The purchasing department must know:

First: Sources of supply.
Second: Past and estimated future consumption.
Third: Quality.
Fourth: Prices.
Fifth: Intended use of material purchased.

This knowledge is obtained by never-ending study, and so tabulated as to be instantly available. The methods of obtaining this information, are through observation, literature, membership in associations and commercial friendship.

It is advisable for the buyer to visit vendors periodically, noting if their stock is adequate and well kept and checking up their delivery equipment, forming a definite opinion whether they could properly serve him in event of an emergency.

It is also part of the buyer's duties to visit the company warehouse as often as practical, to check the quality of material purchased, as well as arrange for disposition of scrap and obsolete material.

The buyer who makes it a point to see in actual use the material he purchases, possesses a considerable advantage over the one who does not do so.

In literature, the buyer should have standard trade registers, such as, Thomas, MacRea's, Hendrick's, trade papers in his own and allied lines, government publications, the value of which is too often not half realized, weekly bulletins of National Chamber of Commerce and Year Book of American Society for Testing Materials.

The buyer should be a member of trade associations in his own line, the Purchasing Agents' Association, local chamber of commerce and local "ad" club. Commercial friendship is a most vital factor for service. A friendship with all vendors and their representatives should receive intensive cultivation.

The buyer at all times should have with him an auxiliary memo book, showing residence phone numbers of heads of business, to enable him to get in touch with them at night in case of emergency.

The foregoing is a brief outline of necessities in buying, but there are a multitude of things which cannot be tabulated, some of which will be mentioned in the general remarks to follow.

The buyer must maintain a standard of honor and dependability which will merit the respect and attention of the seller.

He must be free from prejudice and willing to be guided by the results of investigations made by himself and others.

A buyer can never tell when he is going to learn of something valuable to him. He may see some new method in a plant entirely foreign to his line, which may be applied with a considerable saving. An "ad" in a trade paper, a circular in the mail or a scrap of overheard conversation, may result in a yearly saving of thousands of dollars.

The old saying that the "best is the cheapest in the end," does not always apply, for under certain conditions a cheaper article may represent economy, and it is only by seeing the article in use that the buyer can determine what to purchase.

In purchasing, quality, service and price should only be considered in the order mentioned. The saving in first cost is not the point to be sought, but the maximum service for the amount expended.

The advantages of centralized buying have been forcibly brought to public attention in the adoption by seventy-five of our cities of the commission manager plan of government. To illustrate the point, I quote from the first annual report of the City Commission of Dayton, Ohio, dated January 1, 1915, which reads: "Through a standardization of all supplies and materials, and by combining purchases of the various departments and taking advantage of the market conditions, there has been effected a saving of $33,000 this year over prices paid last year without sacrificing quality."

The fund of good information obtained through combined effort, has never been realized by buyers until recently, the Purchasing Agents' Association being of recent origin. Free illustrated lectures have been given by manufacturers to the Purchasing Agents' Association of Los Angeles, which were very instructive and could have been taken advantage of before, had there been an association to receive them.

Through the local chamber of commerce, the author has located small manufacturers who neither advertise nor employ salesmen, their output being taken exclusively by jobbers. On solicitation, however, they were found willing to supply our requirements at jobbers' prices.

Another function of the buyer is to keep alive competition between the big house and the little fellow, and this calls for diplomacy which the successful purchaser must possess in marked degree.

Some writers argue that personal contact between buyer and seller is no longer necessary. The author takes exception to this, believing that greatest efficiency comes only through mutual helpfulness, and that a friendship with salesmen and heads of business, places the buyer in a position to receive service that could not possibly be obtained any other way.

Large losses are so glaring as to attract attention, which at once stops them. Small losses whose total if allowed to continue would eclipse the aggregate of the large ones, are, generally speaking, stopped through the efforts of the purchasing department.

One more thought in conclusion, namely, efficient buying not only produces lower operating costs, but through the resultant economy in selling expense to the vendor, enables him to quote a lower price than formerly.

SPARKS—CURRENT FACTS, FIGURES AND FANCY

The Russian-American Chamber of Commerce is discussing the question of sending Russian students to North America in order to make them acquainted on the spot with the commercial activity of the United States and its industries.

* * *

The immediate object of teaching the Slavic tongue as conceived by President Suzzallo in a new course to be given at the University of Washington, in Seattle, is to train men in the language necessary for the new trade between the Northwest and Russia.

* * *

New York chemists report that kelp grown in the waters of the Pacific Ocean makes possible an annual supply of potash valued at ninety million dollars and fertilizer nitrates having a value of sixty million dollars. This field of industry will again open up new opportunities for western power companies.

* * *

A movement has been launched by Pacific Coast men to promote commercial and educational relations with the Chinese nation. Julian Arnold, American commercial attache to China and Japan, reports that the Chinese are exceedingly anxious to heighten commerccial relationship with America.

* * *

It was recently reported in engineering circles that persons in the employ of the Pacific Gas & Electric Company had gone out armed with Springfield rifles to shoot the California Railroad Commission. Upon investigation the report was found true, the company employes having bested representatives of the Railroad Commission at an exciting contest in target practice.

* * *

Each day draws nearer to the time when our great natural water powers will have wide application for electro-chemical industries. The recent national exposition of the chemical industries held in New York City brought out the interesting fact that today America produces three-fourths of the artificial colors normally required by our textile, paper and other industries, this having taken place since the supply from Germany has been cut off.

* * *

It has been decided by the Commonwealth Government of Australia to appoint a commission to visit the United States to investigate and report upon the methods of manufacture and production in that country and the conditions of employment therein . The commission will consist of six representatives of the manufacturers in Australia, one from each state, together with six representatives of the workers, one also from each state.

* * *

Tokyo papers state that a Japanese professor has invented an incombustible celluloid which can be made from soya-bean cake, and is superior to all others of the kind, in that its cost is only about 20 sen ($.10) per pound, as compared with the normal cost of $5 and $6. It is also stated that a valuable lacquer varnish is obtained as a by-product.

* * *

A competitor to bleaching powder for laundry use, when produced electrolytically or otherwise, has come forward in the chlorinator. This machine may be set up in any laundry and operated from electric service as bleach is needed. It consists essentially of a 50-gallon vat, a 50-gallon stone tank and a soapstone electrolytic cell, with ammeter, thermometer and hydrometer.

* * *

The Sperry searchlight, a recent invention controlled by the U. S. Navy, takes 150 amperes, has a cored positive carbon of only 5/8 in. in diameter, which is kept in constant rotation and gives out about three and one-half times the light that is projected from the standard carbon used in searchlights. This high intensity searchlight has an intrinsic brilliancy of sixty-five per cent that of the sun when at a thirty degree elevation.

* * *

Turbo air compressors, like steam turbines seem destined to replace the reciprocating type. Single units have been built capable of delivering as high as 60,000 cu. ft. per min. of free air up to a pressure of 170 lb. per sq. in. Turbo-compressors deliver air at practically constant pressure under wide variation in demand, require less floor space, cost less and have a higher over-all efficiency than reciprocating compressors.

* * *

Electricity has characteristics preferable to all other forms of energy. Among these characteristics may be mentioned its high efficiency of generation, the simplicity and efficiency of its transmission, the economy and simplicity of its distribution, the practicability of subdividing it into small units, making possible the generation in large bulk and its application by small consumers and its high efficiency of conversion into other forms of power, especially in small quantities.

* * *

The "cold light" system of Prof. Dussaud, is again being exploded as a novelty in the daily press though its fallacy was exposed some years ago by "The Electrical Review" of London. "The essence of the system is to spin a number of electric lamps on a wheel, each lamp being energized in turn for a fraction of a revolution, so as to give the impression that the light is continuous. As the heat developed whilst the lamp is burning is dissipated whilst it is out, the lamps remain cool—hence the term, "cold light." It is merely a roundabout and elaborate way of obtaining the same result as would be secured by burning one lamp and keeping it cool with a water-jacket or a fan. Whatever advantages are claimed for the Dussaud system can be far more easily and cheaply obtained by other means."

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Basis for Utility Valuation

That the "cost of service" is all wrong as the sole basis for public utility rate-making has long been the opinion of many operators. With some, this disagreement with the ideas of many regulating commissions has become a settled conviction. They feel that the time is at hand when facts should replace theories.

Perhaps the most recent and positive statement of the average commission's ruling is contained in the dissenting opinion of Commissioner Edgerton of California in the Southern California Edison condemnation case at Los Angeles. He italicizes his belief that "a proper rate in a successful public utility business should realize the total cost of service, no more and no less."

This means that a management which is able to show a high cost of service is entitled to a high rate for rendering that service. It places a premium on inefficient and extravagant management. It penalizes progress. Consequently, in the ultimate analysis, it is economically unsound.

Yet a wholly satisfactory substitute has not been found. Some objection has been raised to other proposals which have already been put forward. The theory of a rate based on the value of service, for instance, does not seem, in the opinion of some, to provide sufficient protection to the consumer. To charge all that the traffic will bear savors too much of unregulated monopoly.

Recently, however, some new ideas have been propounded. One of these is found in the decision of the Washington Public Service Commission in the valuation of the Pacific Telephone & Telegraph Company. They define fair value as "the reasonable and necessary detriment a utility suffers in preparation for, and in the service of, its patrons." As this is independent of changing money markets, shifting population and such variables, it gives a more stable foundation for appraisal, a certain fixed and definite amount, constant and easily ascertainable. It is independent of unearned increment and decrement, and other values created by the public.

Another excellent idea is suggested by Mr. Leslie Craven of Portland, Ore., elsewhere in these columns. He emphasizes the importance of a consideration of functional as well as of physical depreciation in arriving at a fair value His argument may be better understood by the life insurance analogy. Physical depreciation is like death from old age, functional depreciation like death from accident. Insurance against loss from obsolescence and inadequacy is a difficult undertaking because the human mind cannot accurately predict the curve of progress,—inventive and legislative.

While these two ideas differ in several material respects they are alike in requiring recorded facts. In order to ascertain the detriment suffered by a utility in the service of the public, it is necessary to know actual performance based on records. In order to determine the possibility of obsolescence statistics must be available. These records of actual performance and statistics of functional depreciation have seldom been kept. When available they have proven an invaluable aid in arriving at fair values. They

should be of general application referring only to individual cases.

The inference is obvious. Before public utilities can expect that either of these methods, or any others based on facts and not on theory, will be applied by commissions, they must present the figures. Then and then only, will an entirely suitable basis meet with universal agreement.

The Elimination of Noise

The unnecessary glare of automobile headlights and other methods of illumination is no more offensive to the eye than are the unecessary noises of modern life to the ear. Blare is fully as disagreeable and dangerous as glare. Both should be obviated.

Effective steps have been taken to protect the eyes of the people but little has been done to protect their ears. The honk of automobiles, the clang of street cars, the whistles of locomotives are all tending to defeat the very purpose of their existence, for their excessive and continuous noise will eventually and inevitably make people hard of hearing.

The complexities of modern civilization have so multiplied noises that they are unbearable to the highly nervous and insidiously wearing down the nerves of the less sensitive. As people awake to this fact strict regulation will be instituted for the suppression of unnecessary noises.

The hospital zones should and will be extended to include all residence districts. Boiler shops and noisy factories will be segregated and every precaution taken to minimize noise in manufacturing and communication. The time is approaching when noise will be tolerated only as a signal of extreme danger.

In the substitution of silent signals for discordant sounds the electric light will play a prominent part. A hint of its possibilities in this direction was given at Portland, Ore., some years ago, when the electric power company announced the results of an election in every home in its system by lamp flashing. Light signals have also been a success in factories where the duties of the workers are in sequence. Many other applications will suggest themselves and thus may efficiency be provided and danger lessened by the elimination of noise.

Irrigation Reports

For some years past governmental and state authorities have published from time to time detailed reports of cost and expenditures encountered in the various reclamation projects that have received either federal or state aid.

Recently a number of privately owned irrigation enterprises have undertaken to do the same thing. The plan is proving to be an excellent one.

Take for instance the recent reports published by the Imperial Water Company No. 1 in Imperial Valley. This report gives unit costs during the year as compared with costs of former years. The Imperial Water Company No. 3 in its recent report goes still further in giving unit costs of structure. Just off the press is another interesting report which is that of the Modesto-Turlock irrigation system.

Such reports setting forth all expenditures in a detailed manner engenders a spirit of confidence not otherwise attainable. But best of all the public at large is thereby enabled to have the benefit of this information which is of most valuable assistance in planning other irrigation systems and in forecasting the cost of operation.

Another feature that is commendable is that of the publishing of the overhead costs. The frank publication of such data quiets gossip and immensely aids in instilling confidence in the management.

And finally its publication demonstrates beyond the question of a doubt that the building, operating and maintaining of vast privately and mutually owned irrigation projects are possible without appealing to governmental aid.

As a whole this open-minded policy of publication unquestionably receives the strong commendation of the users of irrigation systems in particular and the public in general, and it is to be hoped that more and more of the irrigation companies will follow this excellent precedent now so auspiciously established.

Confidence in the West

Once again western brawn and ingenuity are to triumph in engineering structure. On another page of this issue announcement may be found covering details of construction for the gigantic office building that is being erected in San Francisco at the foot of Market street by the Southern Pacific Company.

It is significant that the Southern Pacific Company has such unbounded confidence in California and the West to invest over two millions of dollars in the bare cost of a building without furniture or fixtures.

Looking into other details announced by the management it may also be seen that this building is thus not only to be of record breaking proportions but in addition it is to represent the last word in office building and equipment. For instance an idea of the efficiency details looked after may be gained from the fact that there will be a pneumatic tube mailing system throughout, which will convey papers and telegrams to a central mailing room, there to be redistributed either between offices in the building or to outside points.

Again one scarcely realizes why a corporation should expend moneys for such enormous office space until he reviews in mind the enormity of the corporation which is undertaking the work. The Southern Pacific Company today employs over fifty thousand people in its operation. In this building over two thousand of these employes will be housed. The pay-roll of this company brings monthly over five millions of dollars to San Francisco and the bay region, while twenty per cent of the taxes paid into the coffers of the state of California come from the holdings of this great corporation, to say nothing of the vast sums of money it contributes to other western states.

Summarizing the proposed structure as a whole it would seem that the management have well-weighed the proper method of interlinking still further their destinies with the people of California and the West. It is needless to remark that this spirit of confidence will not be overlooked by the people.

PERSONALS

W. K. Brown, district manager Crocker-Wheeler Company, is visiting Portland and Seattle.

S. B. Greggory, of the Arrow Electric Company, has returned to San Francisco from the Northwest.

Geo. P. Ey, local auditor of the General Electric Company at Los Angeles, was at San Francisco this week.

C. E. Spaulding, sales manager General Electric Company at Los Angeles, was at San Francisco during the past week.

Llewellyn Evans has succeeded **B. W. Collins,** resigned, as superintendent of the municipal lighting plant at Tacoma, Wash.

R. F. Behan, assistant manager San Francisco office Westinghouse Electric & Manufacturing Company, is taking his annual vacation.

H. S. Perkins, Pacific Coast representative of J. H. Parker, Inc., porcelain manufacturers, left San Francisco for an eastern trip this week.

H. B. Squires, of H. B. Squires & Company, manufacturers' agents at San Francisco, has returned from his vacation at Squaw Camp, Oregon.

W. W. Spangler recently assumed charge of the new branch treasurer's office of the Westinghouse Electric & Manufacturing Company at Seattle.

Samuel Kahn, vice-president and general manager Western States Gas & Electric Company at Stockton, Cal., left this week for a month's trip East.

W. A. Murphy, electrical inspector at Stockton, Cal., has been completely exonerated on charges of unfitness for office recently brought against him by a Stockton contractor.

A. Morbio has resigned as electric vehicle specialist with the Great Western Power Company, to join the sales force of the Kissel Car Company at San Francisco.

Paul A. Shilton, southern manager for R. J. Davis, agent for Century motors and fans, is making an extended tour through Arizona, and will visit the Century factory at St. Louis before his return.

E. B. Strong, president and general manager Journal of Electricity, Power and Gas, left San Francisco this week for an extended eastern trip, in the course of which he will attend the Jovian congress at Indianapolis.

H. M. Crawford, formerly connected with the San Joaquin Light & Power Corporation at Bakersfield, has been appointed sales supervisor for the Pacific Gas & Electric Company in their Marin and Sonoma county districts.

H. F. Yost has been appointed manager of the San Francisco office of the Trumbull Electric Manufacturing Company. Mr. Yost has been connected with the electrical industry on the Coast for years, and has been assistant manager of the San Francisco office for some months past.

Frank Fagan, manager Edison Lamp Works of General Electric Company at San Francisco, has returned from a conference of sales managers and factory superintendents of the company at Association Island. He also attended the convention of the Illuminating Engineering Society.

James E. Barker, electrical and mechanical engineer of Los Angeles, was at San Francisco during the past week in connection with the rehabilitation of the Yuma Water & Electric Company of Yuma, Ariz., which is being operated by the Title Insurance & Trust Company of Los Angeles as trustee.

D. F. McGee of the Electric Bond & Share Company, with headquarters in New York City, is on a tour of inspection of the Utah Power & Light Company's properties. He has recently visited the system of the Western Colorado Power Company and will go from Salt Lake City to the Northwest where his company has extensive interests.

Robt. F. Cooke, chief electrician Trinity Gold Dredging Company, Lewiston, Cal.; **A. B. Creveling,** Pacific Power & Light Company, Walla Walla, Wash.; **Ernest Hinrichs,** Commonwealth Mining & Milling Company, Pearce, Ariz.; **H. S. Jones,** Robbins & Meyers Co., San Francisco; **G. R. Ostermann,** Pacific Gas & Electric Company, Woodland, Cal.; **R. O. Rutherford,** Pacific Telephone & Telegraph Company, Los Angeles; **R. B. Steiert,** Chanslor-Canfield Midway Oil Company, Fellows, Cal.; **Chas. L. Sumner, Jr.,** United Railroads, San Francisco; **Eugene Tays,** Pacific Gas & Electric Company, Benicia, Cal., and **Frederick William Tuck,** Giant Powder Works, Giant, California, have been elected associate members of the American Institute of Electrical Engineers.

MEETING NOTICES.

Great Wesern Power Company's Picnic.

The company's first annual picnic was held at East Shore Park, Richmond, Cal., September 30, 1916. Nearly 200 enjoyed the company's hospitality and participated in the field sports and dancing. Useful prizes were awarded winners. The most interesting contest was the baseball game between employes of the City Electric Company, San Francisco, and the Great Western Power Company of Oakland, the latter winning by a score of 13 to 7.

Oregon Association Electrical Contractors and Dealers.

The association gave a luncheon at the chamber of commerce September 24th in honor of Albert H. Elliott, W. S. Berry and T. E. Bibbins of San Francisco. Mr. Elliott gave the principal address. The general meeting of the Association was held at the Electric Building on Wednesday evening, September 27th, and it was decided to hold the annual meeting and election of officers on Wednesday evening, October 11th. The principal subject up for discussion was Overhead and Profit and several fine talks were had upon the subject, all going to show that the members are beginning to realize that those two things are essential in successful business.

Oregon Society of Engineers.

The first regular monthly meeting of the Oregon Society of Engineers for this fiscal year was held at the Portland Chamber of Commerce, September 22. The members and their guests first enjoyed a dinner and special phonograph selections, which were donated by Eilers Music Company, after which the regular business of the society was transacted, followed by the speakers of the evening.

The constitutional amendment "regarding the election of new members, making it only necessary for new members to be acceptable to four-fifths of the executive committee instead of having the whole membership vote on the applications for membership."

The president announced that the second issue of the society's Journal would be out in two weeks.

The talk of the evening was on "Ship Building." The first speaker was Mr. Tuttle, of the Northwest Steel Company, who spoke on the steel ship building industry. His company is now building three of the largest and best strictly cargo steamers which will be afloat. They consist of two decks, full poop and forecastle. The crew are housed in the stern of these vessels. Their capacity is 12,330 tons displacement, 425 ft. in length, and 59 ft. beam. It takes 3000 tons of steel to construct them and 800,000 rivets must be driven. The fuel oil is carried in the double bottoms. Speed 10½ knots. Cost $1,000,000. The Northwest Steel Company build all of the ship except the machinery, which is built by the Willamette Iron & Steel Company of Portland.

The following method is pursued when a ship is constructed: Preliminary plans and specifications are gotten out and orders placed for material. Then detail plans are made. These are sent to the mould loft and one, two or three sections are made on actual dimensions on the floor of

this shop. Also a body plan is made to represent the ship, and from this plan all floors, frames, beams and all parts of the structure are laid off and templates made and the steel is fabricated from these.

In building a steel ship the hull must be kept as light as possible. These boats are sold on their dead weight capacity. Those ships have 8800 tons dead weight capacity and 7500 tons cargo capacity. His company is adapting its structural steel methods to ship building, and has been very successful as it has had all "fair fits" and have been complimented by the Lloyds' representative.

There are to be built seven of those ships by this concern. At the present time there are 70 building on the Pacific Coast, representing about $60,000,000 in value.

On the interior construction of the ships Mr. B. C. Ball, of the Willamette Iron & Steel Company, said that reciprocating engines are a thing of the past. Turbines are used universally. All auxiliary machinery is furnished by different specialty companies. In order to determine the horsepower necessary to drive a ship at a given speed, it is the common practice to send the plans and specifications to a testing tank, such as Professor Saddlers at Wisconsin University, and have them find out this value by the law of comparison. This is done by testing an exact model made in wax.

C. W. Steele of the Columbia Engineering Works was the next speaker. His company is going to build single deck, auxiliary type of schooners, equipped with semi-Diesel engines. He stated that he thought that it would take four or five years before the world could turn out enough ships to catch up with normal tonnage, so ship building would be good for that period anyway. The cost of these boats is 45 per cent of steel with a life of 50 per cent of the steel ship, and cost 25 per cent as much to operate. At present charter prices, a ship will pay for itself in one year.

Mr. Fred A. Ballin, naval architect and consulting engineer of Portland, gave a talk covering his 40 years experience. He pointed out how wooden ships were built in Europe and were a work of art. These were the clipper ships of 60 years ago.

To protect the bottoms yellow metal was used as these boats would go on two year voyages. The metal being separated from bottom by felt. The ship being put together with iron. The sea water set up a battery action and soon the whole ship fell apart. Peg construction would not hold. Consequently it became necessary to put the strength in the inside of planking in ships. Ships could only be built in limited size on account of timber limitations. The rules of registry were formulated on this basis. By 1860 wooden ship building died out due to lack of materials in Europe. During 1880-1890 wooden ship building thrived on the Great Lakes, but the timber sizes also limited sizes of ships could not exceed 38 to 40 ft. beam, as the bottom would come up.

He said that wooden ships will outlast steel ships in salt water if the wood is properly treated before construction. Fir wood has no acid and iron was attacked in salt water, though modern steel ships rust out in 25 years.

Naval engineering and architecture did not enter into ship building until steel ships were built, consequently this is another reason why wooden ships were unsatisfactory.

It is Mr. Ballin's opinion that wooden boats with steel for its tension members can be built as long as steel boats. He had the design made complete for one 330 ft. long. He also pointed out that there was not one book published on wooden shipbuilding. The world must be educated that modern ships of large size can be built in the northwest which have longer life than steel ships and cost less to build, as the timber sizes are larger than any place in the world and is free from acids that react in sea water to cause iron to fail. This would establish a permanent industry while the building of single deck auxiliary schooners likely will react and not be satisfactory as their life and capacity is limited and they can not become a solid investment.

Upon Mr. Ballin's suggestion a resolution was passed by the society to investigate whether or not a course of naval architecture could be established in some of the Oregon educational institutions. The members of the committee were as follows: Messrs. Ballin, Tuttle, Steele, Naramore and Turner. The following members entered into the ship building discussion: Messrs. Stephens, Broili and Henny.

Mr. F. O. Boili read a letter urging upon the society the endorsement of the law before congress to appropriate money to be used in the various land grant colleges for experimental engineering work. This was given the endorsement of the society and the following committee appointed to handle same: Messrs. Rands, Reed, Datan and Steel.

Pacific Coast Electrical Supply Jobbers.

Although the meeting at Hayden Lake, Idaho, September 21 22 and 23, 1916, was held further from San Francisco than any other meeting yet held, the attendance was large. There were many new faces present, especially representatives of jobbing houses from Salt Lake City, Butte, Spokane and Seattle. The following jobbers registered at the hotel:

P. J. Aaron, Fobes Supply Company, Seattle, Wash.
Hary Byrne, Northcoast Electric Co., Seattle, Wash.
T. E. Bibbins, Pacific States Electric Co., San Francisco, Cal.
A. H. Nylen (wife and child), Gilson Elec. Supply Co., Oakland.
N. W. Graham, Holabird Electric Co., Los Angeles, Cal.
C. B. Hawley (and wife), Inter-Mountain Electric Co., Salt Lake City, Utah.
R. S. Folland, Capital Electric Co., Salt Lake City, Utah.
H. H. Hoxie, Elec. Ry. & Mfrs. Sup. Co., San Francisco, Cal.
H. W. Turner (wife and daughter) The Montana Elec. Co., Butte, Mont.
H. L. Bargion, Washington Elec. Co., Spokane, Wash.
W. S. Berry, Western Electric Co., San Francisco, Cal.
D. J. Butts, Western Electric Co., Salt Lake City, Utah.
J. I. Colwell (wife and child) Western Elec. Co., Seattle, Wash.
A. S. Moody, Pacific States Elec., Portland, Ore.
Frank P. Zorn, Pacific States Elec., Seattle, Wash.
C. C. Hillis (wife and boy) Electric Appliance, San Francisco.
John A. Ryan, Western Electric Co., Portland, Ore.
C. M. Will, Fobes Supply Co., Portland, Ore.
R. J. Dinwoody, Intermountain Elec. Co, Salt Lake City, Utah.
Albert H. Elliott, Secretary, San Francisco.

In addition the following manufacturers' representatives were present:

H. E. Sanderson, Bryant Electric Co.
W. C. Wurfel, Westinghouse Lamp Co.
S. V. Gates, General Electric Co.
Brewster Hall, Pass & Seymour.
S. B. Gregory, Arrow Electric Co.
W. D. McDonald, Westinghouse Elec. & Mfg. Co.
Carl Wernicke, Westinghouse Electric & Mfg. Co.
F. G. Larkin, Telephone Electric Equipment Co.
O. W. Lillard, Gould Storage Battery Co.
F. G. Beck, American Ever Ready Co.
J. W. Leighton, American Ever Ready Co.
A. E. Griswold, A-G. Electric Co.
Miles Steele, Benjamin Electric Co.
C. P. Stevens, C. O. Aspinall, G. C Mandalay

Hayden Lake is a most beautiful body of water, reminding one very much of Lake Tahoe, in California, but it has the advantage of being smaller. Around the lake are many beautiful residences. The fishing is fairly good. Harry Byrne and N. W. Graham, after strenuous labor, brought in a fish, a trout, which they said they caught. After the postmortem was held upon the fish for the purpose of preparing it for the table, it was discovered that the fish was cross-eyed, and the general opinion is that the fish ran into their boat and thus got itself caught.

The usual golf tournament was held. The manufacturers' cup, donated by the jobbers' was won by Miles Steel, with a gross score of 105, his handicap of 10 making 95 net. The Pass & Seymour cup was awarded to J. I. Colwell, 95 gross, 90 net.

A. S. Moody won the jobbers' cup, the Bozanta Tavern cup and a trophy presented by H. W. Turner, with a score of 92 gross and 84 net. The Turner trophy is to be played for by the jobbers, manufacturers and central stations, and will become the property of the one winning it twice in succession or three times.

The golf dinner given by the hotel on Saturday night was unique in that the guests all enjoyed a pheasant dinner.

H. W. Turner acted as toastmaster, and though he modestly disclaimed any particular genius in this line, all present voted him a most model and excellent toastmaster. He called upon C. C. Hillis to present the copper cup to the winner, and this was done in a speech touching upon the history of that old relic. The other cups were presented in fitting speeches and the dinner was voted the usual success.

At the open meeting between the manufacturers and jobbers the subject for discussion was "Slow and Fast Moving Stock." Mr. Bibbins introduced the subject, talking as follows:

"The jobbers were expected to be warehousemen and absorb freight and take care of obsolescence. These elements assume large proportions and it is the old question of a stock problem. This question is little appreciated in the East where jobbers are not compelled to carry large stocks because they are close to manufacturers' stock upon which they draw freely. It is difficult therefore to make an Eastern jobber or manufacturer understand the problem which confronts the jobber on the Coast.

"For example: We knew of an Eastern jobber who carried a limited line of conduit, although he was a large jobber. The Coast jobber packed large stocks and assumed greater burdens. They must carry slow moving stock, for example, 4 in. pipe. The profits are out of all proportion to the expense in some of the scheduled lines where jobbers are remotely situated from manufacturers, and it ought to be the business of the jobber to see that a proper scale of profit is determined upon with respect to the slow moving stock.

Mr. Berry then said: "That the manufacturer was interested in the proposition as much as the jobber. The jobber is trying to cut down his investment by eliminating slow moving items, but if all jobbers cut out slow moving items, the manufacturers would not have stock on the Coast and the jobbers could not do business on the basis of shipments from the East, and the business would thus travel to the manufacturers representatives. If we are compelled to eliminate our stock we will reduce our service."

Mr. Hillis said "the manufacturer sets a high profit on 4 in. stuff because it is slow moving. The jobber is compelled to sell on the same ratio of profit as ½ in. pipe. The manufacturer ought to recognize the difference between fast and slow moving stock and ought to arrange to take care of the jobber on that situation."

Mr. Hawley said that with condulets and special receptacles, the manufacturer takes care of himself. He has forgotten the poor jobber and he forgets this question affects us as it does not affect the jobbers in the East.

The discussion was continued by Messrs. Hall, Steele, Sanderson, Lillard, Gregory and Beck.

California Association of Electrical Contractors and Dealers.

The regular monthly and quarterly meeting was held at Stockton, September 30th, with an attendance of 52 contractors, dealers and jobbers. Various matters of routine business were transacted during the afternoon, including the endorsement of the Society for Electrical Development's plans for "America's Electrical Week," December 2-9.

L. F. Youdall of Stockton, presided at dinner in the evening where the first speaker was President F. J. Somers of San Jose, who reported briefly concerning the Seattle meeting of the Washington Association of Electrical Contractors & Dealers.

E. C. Browne of San Francisco then presented a number of practical suggestions for the guidance of members. He had distributed a form for a universal reminder sheet to prevent mistakes in figuring conduit work. He showed the evil of contractor's giving the customer the whole benefit of advantageous buying on a rising market or in large quantities. He pointed out that estimates on labor cost are apt to be too low because the work is seldom done on a 100 per cent basis and consequently advocated that 20 per cent be added to such estimates. "Slack times are no more an excuse for a ruinously low price than are busy times for an excessively high price." He urged that more attention should be paid to estimating in order to make contracting profitable.

Universal Reminder Sheet for Conduit Work.

Architect ..... **Date**.....

Owner.....

Location.....

Outlets in Watts. Switches. Receptacles. Drop
40, 60, 100 SP, DP, 3W, 4W. B F Htr. Sgn. Cords
Flrs. Hght. 200, 300, 400. Lock Elec. Door.

....**In. Scale.**

	Conduit.	Coups. & Ells.	Lock. Bush	Condulets	Wire
Mains and Feeders.					
Main Light Service.					
Main Power Service.					
Feed.					

L. & M. Totals.	**Material.**	**Labor.**
Ft. ½ in. Conduit (Blk. or Galv.)		
Ft. ¾ in. Conduit (Blk. or Galv.)		
Ft. 1 in. Conduit (Blk. or Galv.)		
Ft. 1 & ¼ Conduit (Blk. of Galv.)		
Ft. 1½ in. Conduit (Blk. or Galv.)		
Ft. in. Conduit (Blk. or Galv.)		
Ft. in. Conduit (Blk. or Galv.)		
Ft. in. Conduit (Blk. or Galv.)		
Ft. in. Conduit (Blk. or Galv.)		
Elbows (Blk. or Galv.)		
Coupling (Blk. or Galv.)		
Locknuts.		
Bushings.		
Condulets.		
Outlet Boxes and Covers and Studs Complete.		
Switches.		
Drop Cords.		
Receptacles.		
Ft. No. 14 S. B. Solid Wire.		
Ft. No. 12 S. B. Solid Wire.		
Ft. No. 10 S. B. Solid Wire.		
Ft. No. 8 S. B. Solid Wire.		
Ft. No. 6 D. B. Strnd. Wire.		
Ft. No. D. B. Strnd. Wire.		
Ft. No. D. B. Strnd. Wire.		
Ft. No. D. B. Strnd. Wire.		
Ft. No. D. B. Strnd. Wire.		
Ft. No. D. B. Strnd. Wire.		
Ft. No. D. B. Strnd. Wire.		
Ft. No. D. B. Strnd. Wire.		
Ft. No. D. B. Strnd. Wire.		
Fixtures.		
Lamps.		
Panel, Switch and Motor Control Boards.		
Bells and Signals.		
Public Phones.		
Private Phones.		
Clocks.		
Drawings and Incidentals.		
Freight and Cartage.		
R. R. Fare.		
Board and Lodge.		
Superintendence.		
Liability and Compensation Insurance.		

Charles Lyman of Stockton read, with due emphasis, Mr. Gould's paper concerning the local situation at Stockton. This report indicated that great good has been accomplished by the association. G. J. King of Oakland added a few well chosen words of encouragement to the Stockton contractors in their efforts to harmonize conditions, giving especial credit to the example of the San Françisco men.

J. A. Woods of Sacramento stated that the chief aim of the association is to educate its members as to what is a proper profit. He suggested that the process of education be extended to non-members, showing that the education of competitors is essential to the self-preservation of the electrical industry. He emphasized the need for records of cost prices, which should be figured to include the expense of handling and delivering as well as the purchase price. In his opinion the subject of credits and collections has been much neglected, and in conclusion he asked that consideration be given to extending the association field of education.

M. L. Scobey of San Francisco, in commenting on his paper presented at the annual meeting, stated that it had not been his idea to in any way intimate that the non-electrical dealer should be discouraged, but to impress upon the electrical dealer and contractor the fact that he is not getting his full share of the business. He cited minor defects he had observed during the day in Stockton shops,—heating devices at old prices, cluttered display windows insufficient lighting, and the like. He told of the advantage of keeping a store

the San Francisco dealers. They are also trying to induce manufacturers to leave more space on blotters and envelope stuffers for the dealer's imprint as well as to provide for uniform practice in charging for freight on heating devices. The association's newly issued electrical data sheets were shown.

A. H. Halloran of San Francisco explained the purposes of the Society for Electrical Development, told of its signal success in the past and outlined the plans for America's Electrical Week, December 2-9. Practical suggestions were given for tying in and cashing in locally on the Society's national campaign. Special stress was laid on the value of advertising as an accelerator of turnover and a reducer of overhead per unit of sales. The active participation of all present was shown to be the only way to realize the benefits to be gained from the Society's activities.

T. E. Bibbins of San Francisco, after complimenting the association on its strength, briefly outlined the essentials which constitute a successful business man,—integrity, common sense, industry and knowledge. He expressed his sympathy with the efforts of the jobbers, under the spokesmanship of W. L. Goodwin, to help the contractor. In conclusion he urged the necessity for patience and forbearance in the association's work.

Samuel Taylor of San Francisco told of his satisfaction with the work being accomplished by the association.

W. S. Berry of San Francisco presented evidence of the contractors' improved condition recently, especially as shown by prompter payment of bills. He advised that education of contractors is easier when they are within than when without the association. An increased membership is necessary to provide funds to carry out the aims of the association. The jobber's assistance is always available in solving the contractor's problems.

C. F. Butte of San Francisco succinctly summed up the statements of previous speakers. He stated that the bankers would not take trade acceptances covering labor or material not intended for resale, and for these reasons the contractor could not utilize them. He showed that the approved practice of adding 25 per cent for overhead and 20 per cent for profit really represented only 16 2/3 per cent profit on the business for the year.

W. L. Goodwin of San Francisco emphasized the fact that a job of years cannot be accomplished in a minute. Impatience is not justified because of seemingly slow progress. He advised a close affiliation with the retail hardware men in the future. He told of his own labors in writing a book dealing with the fundamental problem of the electrical industry and how to meet them. Brief description of the trade acceptance and its use was then given. In conclusion, Mr. Goodwin cited as one tangible result of the association's efforts the elimination of competition from the jobber and central station in the sale and installation of apparatus.

H. C. Reid of San Francisco spoke of the advantages of membership in the association, not only in the opportunity to learn new ideas but in actual dividends resulting from putting into practice the association's theory of providing for a substantial profit in all figures.

The assemblage broke up at a late hour, all joining in singing "America," as patriotic electrical Americans. The following were in attendance:

Jefferson W. Asher, Asher Electric Co., San Francisco.
H. Abernethy, Pacific Gas & Electric Co., Oakland.
T. E. Bibbins, Pacific States Electric Co., San Francisco.
W. S. Berry, Western Electric Co., San Francisco.
Tom Bennet, Rex Electric Co. of San Francisco, Oakland.
C. F. Butte, Butte Eect. & Engineering Co., San Francisco.
E. C. Browne, H. S. Tittle Co., San Francisco.
A. E. Brockway, Latourrette-Fical Co., Sacramento.
C. D. Bass, Commercial Elec. Co.
J. M. Carlson, Central Elec. Co., San Francisco.
E. A. Crowson, Western Electric Co., Oakland.
T. E. Dryer, Western Electric Co.
T. O. Dowdell, Solano's Supply & Construction So., Solano.
Geo. G. Drew, Pacific States Electric Co., Oakland.
N. Ellis, Oakland Electric Co., Oakland.
A. F. Flanagan, Elec. Engr. & Supply Co., Stockton.
C. J. Franke, Commercial Electric Co., Stockton.
R. Goold, Goold & Johns, Stockton.
W. L. Goodwin, Pacific States Elec. Co., San Francisco.
C. O. Gould, Gould, The Lightman, Stockton.
Wm. E. Hayes, Santa Rosa.
D. E. Harris, Pacific States Elec. Co., San Francisco.
M. W. Hild, Elec. & Mch. Equip. Co., Stockton.
A. H. Halloran, Journal of Electricity, Power and Gas.
S. Jackson, Berkeley Electric Construction Co., Berkeley.
C. B. Kenney, NePage-McKenny Co., San Francicso.
Robert King, Oakland.
G. J. King, Oakland.
C. T. Lyman, Lyman Elec. Co., Sacramento.
Frank C. Lyman, Lyman Elec. Co., Sacramento.
W. A. Murphy, City Electrician, Stockton.
W. L. Mitick, Conrad Elec. & Motor Co., Oakland.
M. S. Orrick, Western Electric Co., San Francisco.
A. P. Patzer, Patzer's Electrical Works, Stockton.
H. C. Reid, Pacific Fire Extinguisher Co., San Francisco.
H. A. Sayles, Holabird, Reynolds Elec. Co., San Francisco.
C. E. Stanley, Commercial Elec. Co., Stockton.
M. L. Scobey, Home Elec. Co., San Francisco.
H. H. Schultz, Elec. Appliance Co., San Francisco.
Frank J. Somers, San Jose, Cal.
C. V. Schneider, Sacramento, Cal.
Samuel Taylor, Electric Railway & Mfrs. Supply Co., S. F.
C. J. Thelen, Electric Railway & Mfrs. Supply Co., San Francisco.
G. C. Tiffany, Tiffany's, Stockton.
J. A. Woods, Cal. Mech. & Elec. Eng. Co., Sacramento.
L. F. Youdall, Stockton, Cal.

UNITED STATES CIVIL SERVICE EXAMINATION.

The United States Civil Service Commission invites especial attention to the laboratory assistant examination scheduled to be held on October 11-12, 1916. The department states that probably fifteen or more appointments will be made in the Bureau of Standards from this register during the present calendar year. Since an insufficient number of eligibles has been secured from the last two examinations, qualified persons are urged to enter this examination The entrance salaries of these positions range from $900 to $1200 a year.

NEWS OF PORTLAND CONTRACTORS.

F. A. Bauman & Company report that work on the Portland public auditorium is progressing in fine shape.

The Morrison Electric Company has secured the wiring contract for the new United States National Bank building, at Sixth and Stark streets, Portland, Oregon, the amount being $7500, and also the Vista House, being built upon the Columbia River Highway at Crown Point, amounting to $750, and report completing the roughing in on the Hawley Pulp & Paper Company's plant at Oregon City which contract was for $3000.

The Ne Page-McKenny Company secured the contract for the electrical work on the five story tile building on Broadway near Morrison street for Anton Huth.

J. J. Agutter Company has been awarded the electric contract on the new store building for Frederick & Nelson at Seattle, Washington, for the sum of $42,000.

NEWS OF CALIFORNIA WATER COMMISSION.

The State of California, by S. V. Cortelyou, assistant division engineer of the state highway commission, has applied for permission to appropriate 10 miner's inches of the waters of Salt Creek, tributary to Castiac Creek, for the purpose of highway work in Los Angeles county. A pipe line 18.5 miles long and a small dam and reservoir are parts of the plant required. It is the intention to water about 20 miles of trees on either side of the road. The cost of the works is given in the application at $30,000.

In the matter of the application of Barclay McCowan of Bakersfield, to appropriate 500 second feet of the waters of Caliente Creek and 100 second feet of the waters of Walker Basin Creek, a tributary, the commission has allowed the applicant until January 1, 1917, to file the necessary maps. Mr. McCowan files his application as trustee of a proposed irrigation district to be formed in Kern county.

The application of L. A. Nares and I. Tellman in the matter of the Pine Flat reservoir and its co-related irrigation project is pending before the commission in connection with granting of rights to the applicants by the federal govern-

ment for the reservoir site. The diversion asked for from the commission is for 1,500,000 miner's inches of 37,500 cubic feet per second of the waters of the Kings River in Fresno county. The point of diversion is given as "the South bank of Kings River, where the north and south center line of Sec. 2, Tp. 13 S., R. 24 E., M. D. M., crosses said river. The system is a combination of the fololwing: Alta, Gould, Fresno, Consolidated People's, Last Chance, Grant, Island, Lemore, Murphy Slough, Crescent, Stinson, Mendota, West Side, Fish Slough, James Ranch canals. The proposed diversion works include a dam 295 ft. high, 1100 ft. on top and 350 on bottom of concrete. Power developed from reservoir, by a total fall of 100 ft. three miles down the river, is to be used for pumping for irrigation. It is proposed to develop 20,000 theoretical horsepower.

Geo. W. Rice of Bayles, Shasta County, has applied to the commission for permission to appropriate five cubic feet per second of the waters of the north fork of the North Fork of Salt Creek, tributary to the Sacramento River, in Shasta County, for purposes of agriculture.

Frank B. Hoffman of Big Bar, Trinity county, has applied for permission to appropriate 25 cubic feet per second from Rowdy Creek and 8 cubic feet per second from Pelletrau Creek, tributary to Trinity River for agricultural purposes. The water will be conveyed to the lands by a ditch 1½ miles in length and then a pipe line 1000 ft. long, the estimated cost of the works being $3500.

L. G. Sinnard and Chas. E. Van Barnveld of San Francisco have applied to the state water commission for permission to appropriate for hydraulic purposes, 100 cubic feet per second of the waters of Slate Creek and tributaries, tributary to North Yuba River in Plumas county.

PUBLICATIONS RECEIVED.

"The Flow of Water in Wood-Stave Pipe" is the title of a new professional paper of the U. S. Department of Agriculture, Department Bulletin No. 376, by Fred C. Scobey, irrigation engineer. The bulletin is based upon the results obtained through a large number of experiments on the flow of water in wood-stave pipes ranging from 8 in. to 13½ ft. in diameter. The work also included the collection and analysis of available records of all previous experiments of a similar character. From the results of all experiments made there has been deducted a new set of formulas for the flow of water in stave pipes, which is presented in the bulletin.

SUNBEAM LAMPS IN THE MOVIES.

The electric studio of the Keystone Film Company, at Los Angeles, is 80x120 ft, constructed entirely of reinforced concrete, and was completed six weeks after the first shovel of dirt was removed for the foundation. There are 646 Sunbeam Mazda Photolite lamps used, and work is now being rushed on the remainder of the studio, in which 600 additional Sunbeam lamps will be used. Each bank (side and overhead) carries 9 lamps, and can be tilted at any angle and raised or lowered to any height desired. Each lamp is on an individual circuit and the entire installation is regulated by remote control switches. The installation is the pride of the Los Angeles office of the Western Electric Company, who furnished the equipment.

TRADE NOTES.

Interstate Electric Novelty Company has installed a complete exhibit of Franco products in the display rooms of the San Francisco and Los Angeles Electrical Contractors' Associations.

J. H. Parker, Inc., through Holabird-Reynolds Electric Company, has been awarded the contract for fifty-thousand 4000-volt pin type insulators, ten thousand No. 15 wet process strain insulators and seventy-five hundred No. 504 style wet process guy-strain insulators for use on the Los Angeles aqueduct power distributing system in outlying districts.

North Bend Lumber Company of Marshfield, Ore., will install an additional 40 h.p. motor which will be served by the Oregon Power Company. Two other mills have started running full time, employing about 125 men. A local shipyard has received contracts for construction of three additional lumber schooners and will install 40 h.p. additional in motors, which will be served by the power company. One hundred and twenty-five horsepower more will be added within a short time.

BOOK REVIEWS.

Principles of the Telephone. By Cyril M. Jansky, B. S., B. A., and Daniel C. Faber, E. E.; 9x5 in.; 160 pp.; 125 illustrations. Published by the McGraw-Hill Book Company, Inc., of New York, and for sale at the Technical Book Shop, San Francisco. Price, $1.50.

This book constitutes Part I of a series entitled Subscribers' Apparatus, which is being prepared in the extension division of the University of Wisconsin by the authors, who are associate and assistant professors, respectively, in the electrical engineering faculty of the Univerity of Wisconsin. Details of construction are not given to any great extent in the book. Principles that underlie good construction are, nevertheless, clearly set forth. Especial emphasis is placed upon principles of operation of different types of subscribers' apparatus. At the conclusion of each chapter a helpful set of questions is appended. The book is clearly written and well illustrated. It should prove of value to beginners in the study of practical telephony.

Principles of Alternating Current Machinery. By Ralph R. Lawrence; 4½ by 9 in.; 614 pp.; 273 illustrations; cloth binding. Published by McGraw-Hill Book Company, Inc., of New York City, and for sale by the Technical Book Shop, San Francisco. Price $4.50.

This book deals with the principles underlying the construction and operation of alternating-current machinery. It is in no sense a treatise on design, but is the result of a number of years' teaching experience. The author is associate professor of electrical engineering at the Massachusetts Institute of Technology and Harvard University. The subject matter is treated in the following order; synchronous generators, static transformers, synchronous motors, parallel operation of alternators, synchronous converters, polyphase induction motors, single-phase induction motors, series and repulsion motors. The subject matter is well indexed and the placing of notation symbols at the beginning of the book shows careful planning. The illustrations, of which there are a vast number throughout the volume, are especially clearly drawn. While the book must of necessity deal with severe mathematical treatment, still the written portion of the text is well balanced so that the student is able to absorb mathematical and descriptive matter in almost equal proportions. The book should be welcomed among those interested in the teaching of alternating current machinery.

NEW CATALOGUES.

A list of the publications of the United States Reclamation Service has just been issued and may be obtained by addressing the Secretary of the Department of the Interior at Washington, D. C.

The Crocker-Wheeler Company of Ampere, N. J., has just issued pamphlet on "Motors for Any Application." Bulletin No. 157, on motor applications to printers' machinery, is especially a useful publication for those interested in this line of electrical installation.

A general circular of information covering laws and regulations relating to the reclamation of arid lands by the United States has just been issued by the government and may be obtained by addressing the Secretary of the Department of the Interior at Washington, D. C.

NEWS NOTES

FINANCIAL.

SALT LAKE CITY, UTAH.—The Corinne drainage district in Boxelder county, has received the money for its $175,000 bond issue, and has let the contract for the largest drainage enterprise in Utah. The bonds were purchased by the Palmer Bond & Mortgage Company of Salt Lake from Chapin A. Day of Ogden, who had a contract with the district for the purchase of the bonds, and who also, through the Corinne Concrete Tile Company, now has the contract for carrying through the work.

SACRAMENTO, CAL.—The reorganization committee of the Northern Electric Company after considerable effort to forestall such an arrangement, has decided to allow foreclosure proceedings to be taken by the holders of the underlying bonds, which are the first mortgage liens, comprising the entire bond issue of the company, amounting to $3,770,000; first mortgage issue of the Marysville and Colusa Branch Railway, amounting to $750,000, and the first mortgage bond issue of the Sacramento and Woodland Railway, aggregating $750,000.

SALT LAKE CITY, UTAH.—The Utah Savings & Trust Company has been appointed transfer agent and the Tracy Loan & Trust Company, a registrar in Salt Lake City for the preferred stock of the Utah Power & Light Company, the principal operating subsidiary of the Utah Securities Company. These appointments were made as a result of the large demand for the preferred stock of the company by employes and customers of the Utah Power & Light Company. Directors and employes of the company in Utah have purchased $210,000 of the preferred stock and there has been a large amount placed in small lots with customers of the Company. The Utah Light & Power Company and subsidiary companies now have 2424 employes in Utah and the annual payroll for these is in excess of $1,629,000 a year.

INCORPORATIONS.

ALBANY, ORE.—The Peoples Co-operative Telephone Company has been incorporated here.

ALVADORE, ORE.—Articles of incorporation have been filed for the Alvadore Co-operative Telephone Company.

REDDING, CAL.—The Big Cow Creek Ditch Company has been incorporated with a capital stock of $5000, by Peter Sieh, E. C. Water, R. D. Knickerbocker, L. H. Parks and F. W. Rogers.

RENO, NEV.—Articles of incorporation have been filed by the Natural Gas & Petroleum Company with a capital stock of $1,000 000 and shares one dollar each. The main office is located in Reno. The incorporators are Benj. S. Dudley, C. A. Brown, E. R. Dudley, R. V. Dixon and Frank Thomas, all of Oakland.

PHOENIX, ARIZ.—The Walapai Lighting & Power Company has filed articles of incorporation with a capital stock of $50,000. The officers and directors are: Robert Roe, president; Arthur Fay, vice-president; A. L. Cox, secretary-treasurer. Directors: C. K. Chilberg, Robert Roe, Arthur Fay, A. L. Cox, Wm. Hall.

ILLUMINATION.

CHEWELAH, WASH.—The council has decided to make certain changes in the street lighting system.

DOUGLAS, ARIZ.—The city engineer has completed plans for the proposed new street lighting system.

GARDEN GROVE, CAL.—The subject of better lights for this city is being taken up by the business men's lighting committee.

PORT ANGELES, WASH.—The city council has approved plans for more lights on Lincoln street. The work will cost about $2000.

FLORENCE, ARIZ.—The city council has approved the granting of an electric light and water franchise to the Douglas Investment Company.

CHICO, CAL.—The city council has passed a resolution, calling for the installation of electroliers in the business district by property owners.

BOZEMAN, MONT.—Robert W. Lysle, representative of Chicago interests, is in the city investigating the prospects for establishing an artificial gas plant here.

RIVERSIDE, CAL.—Permission has been granted the Banning Gas & Lighting Company by the board of supervisors to lay gas pipes along the highway from Banning to Beaumont.

MELSTONE, MONT.—The city council plans an electric lighting plant in connection with the water system. The city will purchase materials and award the contract for installation.

STOCKTON, CAL.—A petition has been presented by residents of Tuxedo Park for the proposed formation of a public highway lighting district. October 20th has been set as the time for hearing protests.

PT. ANGELES, WASH.—Electric light extensions both in street and house lighting will be made to the extent of $3400 The city clerk has been authorized to advertise for the sale of $25 000 worth of lighting bonds.

SO. PASADENA, CAL.—A resolution of intention has been adopted by the city trustees for the construction and installation of posts, conduits, wires, etc., along Mission street from Fair Oaks avenue to Prospect avenue.

LOS ANGELES, CAL.—A petition signed by property owners on Washington street between Main and Central avenue asking for the installation of ornamental lights has been presented to the new city council, and referred to the city engineer for checking.

EL PASO, TEXAS.—That the city has definitely decided on a more effective system of lighting the streets, has been announced by Mayor Lea. A test light has been in operation for some time at Rio Grande and Virginia streets and that is the type of light which will be installed.

HANFORD, CAL.—The Central California Gas Company is negotiating for the purchase of the plant of the Hanford Gas & Power Company. The deal, if consummated, would mean an extension of the system to Lemoore, adding about 40 per cent to the service of the Visalia generating plant, which is shortly to be doubled in size.

TRANSMISSION.

TACOMA, WASH.—The Tacoma Railway & Power Company will repair its car barn at South Thirteenth and A streets by day labor at a cost of $6500.

TACOMA, WASH.—Twenty-five thousand dollars will be expended by the city council for beautifying the city's power plant and building five cottages for employes, etc.

STANWOOD, WASH.—Washington Coast Utilities Company, E. G. Robinson, representative, has petitioned the council here for the right to make changes and improvements.

LOS ANGELES, CAL.—The Southern California Edison Company has awarded the contract to E. D. Tyler for the erection of a frame and plaster substation on Huntington Drive.

VANCOUVER, WASH.—The Portland Railway, Light & Power Company was awarded a franchise for operating its

cars over the new interstate bridge here on the Pacific Highway.

SALEM, ORE.—The state engineer has issued a permit to the city of Myrtle Creek to appropriate 150 second feet of the waters of South Umpqua River for the purpose of developing electricity. The estimated cost of the plant is $30,000.

REDDING, CAL.—The T. H. Benton ranch of 1100 acres on Battle Creek has been purchased by the Northern California Power Company. The ranch carries with it the three important water rights from Digger Creek, Bailey Creek and Battle Creek.

BILLINGS, MONT.—Construction of a branch line 35 miles long from Hesper, on the Great Northern, to the heart of the Lake Basin country, 50 miles northeast of Billings, has been decided upon by the Northern Pacific Railway Company. Work will start in the near future.

BANDON, ORE.—The Bandon Light & Power Company has concluded preliminary negotiations with the Oregon Power Company which may result in the sale of their holdings to that organization and the outcome an extension of the service.

ALAMEDA, CAL.—City Atorney A. F. St. Sure has filed an opinion with the city council holding that the Great Western Power Company is now delivering electrical current to the Union Iron Works, contrary to the provision of the city charter. Steps will be taken to force the company to obtain a franchise or cease to operate in the city.

GREENVILLE, CAL.—The Great Western Power Company has several surveying parties in the field between Lake Amador near Prattville, and the proposed plant at Belden. These parties are selecting the most feasible line for the tunnel and canals that are to connect the lake with the proposed plant at the mouth of Butt Creek.

BANDON, ORE.—Negotiations are under way by the Oregon Power Company to extend its transmission line from Coquille to Bandon, a distance of approximately 28 miles, furnishing electricity for this city and all intervening points, including the coal mines at Riverton, the towns of Riverton, Lampa, Parkersburg and Prosper, all of which are on the Coquille River.

LOS ANGELES, CAL.—It is announced by Mayor Woodman that he will call a conference with the water board and the public service commission to arrive at a decision regarding the purchase or construction of a power distributing system. The mayor is in favor of purchasing the distributing system at a reasonable price, but if this cannot be done, he is in favor of building a new system.

SALT LAKE CITY, UTAH.—The ninety mile extension of the Utah Power & Light Company's transmission system to the coal fields in Carbon County, Utah, has been completed and service on the line was inaugurated September 28th. The company is now serving the coal properties of the Carbon County Fuel Company and the United States Fuel Company. Other coal operators in this section will be ready to use service in the near future.

ASTORIA, ORE.—After a controversy extending over a period of several weeks, an amicable agreement has been reached between the city council and the public service corporations, whereby all the electric wires in the district where the streets are being improved with a viaduct system are to be placed underneath the pavement. The overhead wires in other portions of the business district are to be rebuilt and a strictly modern system installed.

SACRAMENTO, CAL.—The jury in the condemnation case of the Pacific Gas & Electric Company against George Shearman and Benjamin F. Biggs for a right of way for a power line, rendered a verdict for the defendants in the sum of $5415, and $350 for the purchase of the land that is to be actually used for the right of way. The defendants valued their land, which is located near White Rock, at $150 an acre and placed the damage on over 1000 acres of ground. The company placed the value of the land in question at $15 an acre for grazing purposes.

TRANSPORTATION.

EL PASO, TEX.—A petition by the El Paso Electric Railway Company to place wires underground in the downtown district is being considered by the city council.

SANTA ANA, CAL.—Rebuilding of the Pacific Electric tracks on Fourth street between Flower and Lacy streets, with repaving of the right-of-way is promised by officials of the road for the near future.

TELEPHONE AND TELEGRAPH.

TOWNSEND, MONT.—J. B. Seeley, supervisor Helena National Forest, plans a line from this place to Smith River Valley, 16 miles long.

PHOENIX, ARIZ.—A private exchange is being installed by the Mountain States Telephone Company for the Pacific Creamery plant east of Tempe.

BEND, ORE.—The Pacific States Telephone Company is planning extensions to its present system in Bend and vicinity which will cost about $12,000.

SPOKANE WASH.—The Pacific Telephone & Telegraph Company contemplates improvements aggregating $26,760 in value. Of this amount $9710 will be spent in Spokane.

SAN BERNARDINO, CAL.—C. C. Coop, general manager of the Postal Telegraph Company of the Los Angeles and San Diego district, has arrived here with a force of men to begin rebuilding the lines which center here. The local office will be equipped with additional wires.

DUNCAN, ARIZ.—A change was made in the ownership of the Duncan telephone system when E. M. Luckie purchased the half interest in the property owned by James V. Parks. The system is now owned by J. F. Allen and E. M. Luckie, and they are planning to make improvements in the equipment and service in the near future.

LA GRANDE, ORE.—Preliminary to minor rate adjustments of the Home Independent Telephone Company, the public service commission has completed a survey of that company's plant here and over the entire system. Engineer Busselle, of Salem, estimates the value of the La Grande exchange at $115,000. Figures for a reproduction of the whole system were placed at nearly $300,000.

IRRIGATION.

SUSANVILLE, CAL.—Residents of Long Valley Creek have petitioned the Lassen County Board of Supervisors for the formation of an irrigation district.

SALEM, ORE.—R. W. Rea, chief engineer for the Ochoco irrigation district has asked State Engineer Lewis to approve plans of the district for holding an election for the issuance of $1,000,000 in bonds. The district was organized on February for the irrigation of 23,400 acres of land situated near Prineville.

TERRA BELLA, CAL.—At a meeting of the directors of the Terra Bella Irrigation District contracts were awarded for the drilling of six deep wells to be put down on optioned land west of the Southern Pacific tracks. The district will probably advertise for bids for the construction of the first unit of the irrigation system and for the sale of the bonds before the six wells now contracted for are finished.

SACRAMENTO, CAL.—The Landis Bros. Company of San Francisco has filed an application with the state water commission to appropriate 100,000 acre feet per annum of the waters of Dry Creek, the enterprise to be known as the Dry Creek Irrigation Project. According to the plans submitted to the commission, construction will begin not later than September 1, 1917, on a diversion dam 60 ft. in height, 1400 ft. long on top and 1200 on the bottom All told, 100,000 acres will be included in the project.

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Straps—Tinned Pipe	List. Per lb.	Sell. Per lb.
½—20 per lb	.25	.25
¾—19 per lb	.25	.25
1 —16 per lb	.25	.25
1¼—13 per lb	.25	.25
1½—11 per lb	.25	.25
2 — 9 per lb	.25	.25
2½— 5 per lb	.25	.25
3 — 4 per lb	.25	.25
Half Pipe Straps.	Per 100	Per 100
½-inch	1.50	1.50
⅝-inch	1.67	1.67
11/16-inch	3.34	3.34
¾-inch	3.75	3.75
1-inch	4.25	4.25
1⅛-inch	4.34	4.34
1¼-inch	5.10	5.10
1½-inch	5.10	5.10
1¾-inch	5.34	5.34
2-inch	5.34	5.34
Fixture Studs.		
⅜-inch, per 100	5.00	5.00
½-inch, per 100	6.50	6.50
Speaking Tube.		
Speaking Tube, per foot	.023	.02½
Elbows	.03	.05
Mouthpiece, plain	.11	.20
Whistles	.33	.45
Flexible Tube, per foot	.31	.50
Flexible Terminals, 2 ft., complete	1.50	1.75
Tube Rack	.30	.30
Tee	.14	....
Switches—Flush.		
S. P., without plate	.45	.45
D. P., without plate	1.05	1.05
3-Way, without plate	.70	.70
4-Way, without plate	2.00	2.00
Flush Lock Push Button.		
S. P. Lock, without plate	1.06	1.25
D. P. Lock, without plate	1.30	1.50
3-Way Lock, without plate	1.30	1.50
4-Way Lock, without plate	2.50	2.50
Key for Lock Push Button Switch	.15	.15
Lock Attachment	.16	.16

The correctness of these suggested selling prices is not guaranteed by publisher. Suggestions for corrections are invited.

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Rotary Flush.	List.	Sell.
S. P., without plate	.62	.65
S. P., without plate	.71	.70
D. P., without plate	1.05	.105
3-Way, without plate	1.05	1.05
3-Way, without plate	.82	.85
4-Way, without plate	1.05	1.05
3-Section Electrolier, without plate	1.05	1.05
2-Section Electrolier, without plate	1.05	1.05
2-Section Electrolier, without plate	1.05	1.05
Switches—Special Push Button.		
Single Pole	1.08	1.10
Double Pole	1.33	1.35
3-Way	1.33	1.35
4-Way	3.00	3.00
Momentary	3.50	3.50
Remote Control Switchplates	3.00	3.00
Removable Mech.		
D. P., without plate	1.20	1.20
S. P., without plate	.84	.84
3-Way, without plate	1.20	1.20
4-Way, without plate	1.20	1.20
S. P. Lock, without plate	1.34	1.34
D. P. Lock, without plate	1.70	1.70
Pendant.		
6-Amp. S. P.	.50	.50
10-Amp. S. P.	.80	.80
6-Amp. S. P., Straight Thru	.60	.60
10-Amp. D. P., Straight Thru	1.20	1.20
Pull.		
10 A., S. P.	1.00	1.00
10 A., 3-Way	1.18	1.20
5 A., 4-Point	1.18	1.20
5 A., Electrolier, 2 and 3 Circuit	1.18	1.20
10 A., D. P.	1.18	1.20
Snap.		
5 Amp., S. P.	.28	.30
5 Amp., S. P. Ind	.32	.35
10 Amp., S. P.	.48	.50
10 Amp., S. P. Ind	.54	.55
3 Amp., 3-Way	.48	.50
5 Amp., 3-Way	.56	.55
10 Amp., 3-Way	.76	.75
5 Amp. 4-Way	.86	.85
5 Amp. 2-Circuit Electrolier	.76	.75
5 Amp. 3-Circuit Electrolier	.76	.75
5 Amp., D. P.	.56	.55
10 Amp. D. P.	.66	.65
Canopy.		
3 Amp. Spun Canopy	.75	.75
3 Amp. Cast Canopy	.80	.80

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ALPHABETICAL INDEX TO ADVERTISERS

The letter and number before each name are used in the classified page following

A-1 American Ever-Ready Works of National Carbon Co
Los Angeles; 755 Folsom St., San Francisco; Seattle.

B-1 Baker-Joslyn Company 3
71 New Montgomery St., San Francisco; 911 Western Ave., Seattle; 353 E. Second St., Los Angeles.

I-1 Benjamin Electric Manufacturing Co.....
590 Howard St., San Francisco.

C-1 Century Electric Co 2
906 So. Hope St., Los Angeles; 56 Natoma St., San Francisco; 65 Front St., Portland, Ore.

C-3 Crocker-Wheeler Co.....
87 New Montgomery St., San Francisco; 228 Central Avenue, Los Angeles.

C-4 Cutler-Hammer Manufacturing Co.....
579 Howard St., San Francisco; Morgan Bldg., Portland, Ore.; San Fernando Bldg., Los Angeles.

D-4 Davis Slate & Manufacturing Co.....
Chicago, Ill.

D-2 Dearborn Chemical Company 11
355 East Second St., Los Angeles; 301 Front St., San Francisco.

E-1 Edison Lamp Works of General Electric Co.....
Rialto Bldg., San Francisco; 724 So. Spring St., Los Angeles.

E-2 Edison Storage Battery Co 11
206-8-10 First St., (near Howard), San Francisco.

E-3 Electric Agencies Co.....
279-283 Minna St., San Francisco; 419-421 E. Third St., Los Angeles.

E-4 Electric Storage Battery Co.....
743 Rialto Bldg., San Francisco.

E-5 Electric, Railway & Manufacturing Supply Co..... 11
34 Second St., San Francisco.

E-6 Electric Novelty Works.....
533 Mission St., San Francisco.

E-7 Economy Fuse & Mfg. Co.....
Kinzie and Orleans Sts., Chicago.

F-3 Federal Sign System (Electric).....
618 Mission St., San Francisco.

G-1 General Electric Co 10
724 So. Spring St., Los Angeles; Worcester Bldg., Portland; Rialto Bldg., San Francisco; Colman Bldg., Seattle; Paulsen Bldg., Spokane.

H-1 Habirshaw Electric Cable Co., Inc.....
(See Western Electric Company.)

H-2 Hemingray Glass Co 11
236-240 So. Los Angeles St., Los Angeles; 345 Oak St., Portland; 807 Mission St., San Francisco.

H-3 Haller-Cunningham Electric Co 11
428 Market St., San Francisco.

H-7 Hurley Machine Co.....
New York and Chicago. (See Pacific States Electric Co.)

I-2 Illinois Electric Co.....
261-263 So. Los Angeles St., Los Angeles.

1-3 Interstate Electric Novelty Co.....
111 New Montgomery St., San Francisco.

L-1 Leahy Manufacturing Co.....
Eighth and Alameda St., Los Angeles.

L-2 Locke Insulator Manufacturing Co 4
(See Pierson, Roeding & Co.)

M-2 McGlauflin Manufacturing Co.....
San Rafael, Cal.

M-3 Moore & Co., Charles C 3
Van Nuys Bldg., Los Angeles; Spalding Bldg., Portland; Kearns Bldg., Salt Lake City; Sheldon Bldg., San Francisco; Mutual Life Bldg., Seattle; Santa Rita Hotel Bldg., Tucson.

M-4 Morse Chain Company 6
Monadnock Bldg., San Francisco.

N-1 Nason & Co., R. N.....
151 Potrero Ave., San Francisco.

N-2 National Conduit & Cable Co., The.....
Trust and Savings Bldg., Los Angeles; Rialto Bldg., San Francisco.

N-3 National Lamp Works of G. E. Co 3
(All Jobbers.)

N-4 New York Insulated Wire Co 3
629 Howard St., San Francisco.

N-6 National Carbon Co 12
Cleveland, Ohio.

O-1 Okonite Co. (The) 12
(All Jobbers.)

P-2 Pacific States Electric Co 2
236-240 So. Los Angeles St., Los Angeles; 61-67 Fifth St. No., Portland; 200-210 Twelfth St., Oakland; 575 Mission St., San Francisco; 307 First Ave. So., Seattle.

P-4 Pelton Water Wheel Co 11
2219 Harrison St., San Francisco.

P-5 Pierson, Roeding & Co 4
Pacific Electric Bldg., Los Angeles; Rialto Bldg., San Francisco; Colman Bldg., Seattle.

P-7 Pittsburgh Piping & Equipment Co 12
Monadnock Bldg., San Francisco.

S-1 Schaw-Batcher Company, Pipe Works, The 4
211 J St., Sacramento; 356 Market St., San Francisco.

S-4 Southern Pacific Co 2
Flood Bldg., San Francisco.

S-5 Sprague Electric Works 12
Rialto Bldg., San Francisco; Colman Bldg., Seattle; Corporation Bldg., Los Angeles; Electric Bldg., Portland; Paulsen Bldg., Spokane.

S-6 Standard Underground Cable Co 3
First National Bank Bldg., San Francisco; Hibernian Bldg., Los Angeles; Central Bldg., Seattle, Wash.; 815 Newhouse Bldg., Salt Lake City, Utah.

T-1 Thomas & Co., R.....
Pacific States Electric Co. and Western Electric Co., Pacific Coast Representatives.

T-2 Tubular Woven Fabric Company.....
Pawtucket, R. I.

U-1 United Sheet Metal Works.....
575 Howard St., San Francisco.

W-1 Wagner Electric Manufacturing Company 12
St. Louis, Mo.

W-2 Western Electric Co.....
Eighth and Santee Sts., Los Angeles; 1900 Telegraph Ave., Oakland, Cal.; 680 Folsom St., San Francisco; 907 First Ave., Seattle; 45 North Fifth St., Portland, Ore.

W-3 Ward-Leonard Electric Co 12
Mt. Vernon, New York.

W-4 Westinghouse Electric & Manufacturing Co.....
50-52 East Broadway, Butte; Van Nuys Bldg., Los Angeles; Couch Bldg., Portland; 212 So. W. Temple, Salt Lake City; 165 Second St., San Francisco; Second and Cherry Sts., Seattle; Paulsen Bldg., Spokane.

W-6 Westinghouse Lamp Co.....
(See Westinghouse Electric & Manufacturing Co.)

W-8 Western Pipe & Steel Co.....
444 Market St., San Francisco; 1758 North Broadway, Los Angeles.